JUNE 1969

RADIO COMMUNICATION

2m MOSFET CONVERTER

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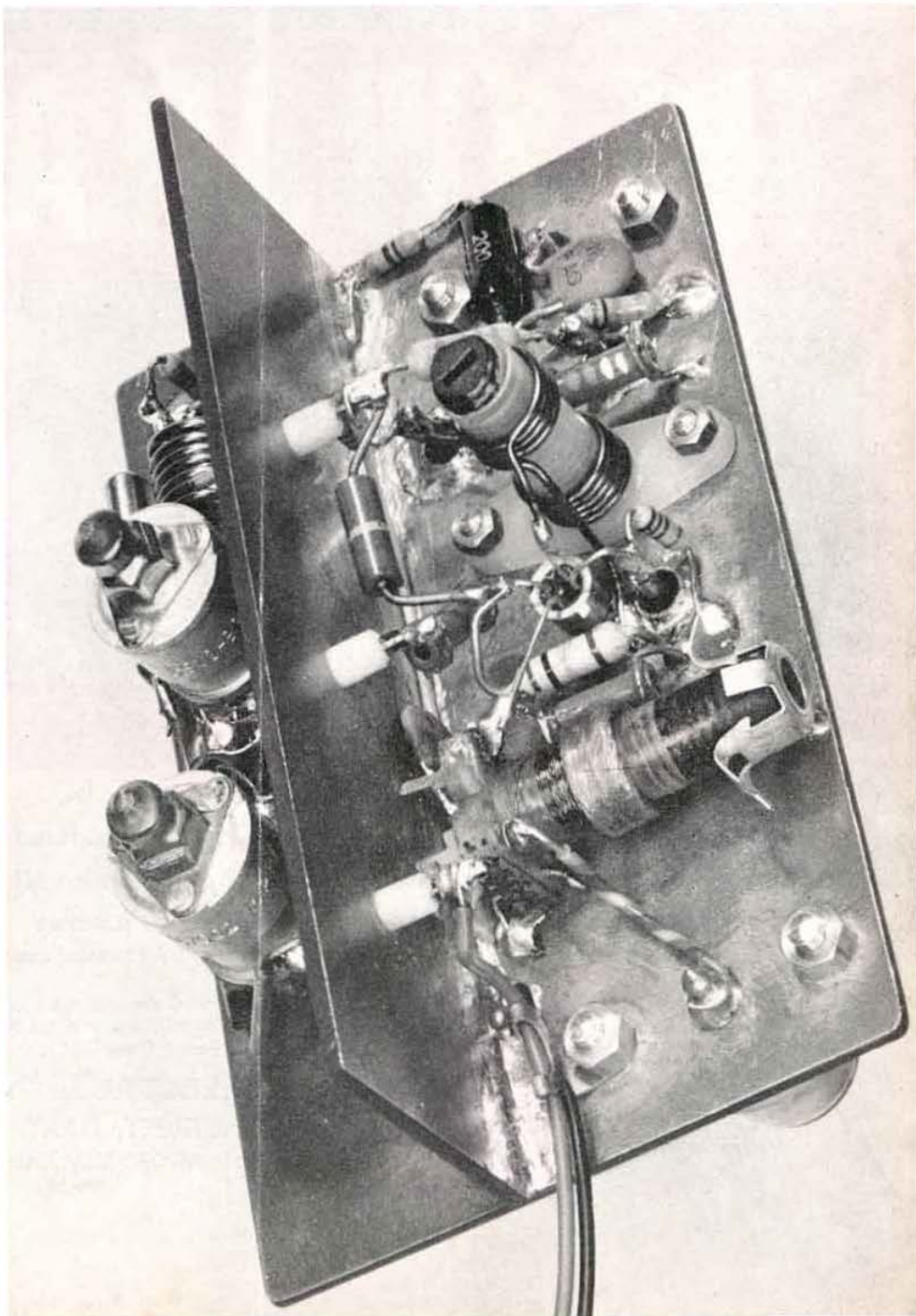

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I will never cease to marvel at you chaps—I just don't understand you! I dig you not, as they say! I have the only FT-250 in the country, (possibly the only one outside Japan). The JA's are raving about it and talk of nowt else, the DL's are licking their lips in anticipation of it's arrival, forming queues to buy. So, I display this little world beater at a couple of mobile rallies—no need to advertise it, or plaster blurb around it, it will be the star of the show—everyone will fight to touch it, to even look at it from afar. John said, "I wouldn't display that—you'll be mobbed". Yeah? Apart from a visiting DL who thrust wads of fivers at me and said "You sell, ja?" to which I replied "Nein, zwei month delivery", hardly anyone gave it a second glance. Well, one or two did—the sort of chap who is in electronics professionally, who travels all over the world and who knows the score. He looks at it, the circuit diagram and the price and goes away. Some days later, when he's flogged his own rig privately he sends a cheque. Apart from these chaps who know whats what, hardly anyone looked at it. Fantastic!

Stop moaning, Bill, start flogging. Talking of moaning, we all moan about rising prices and falling value of the pound. In this business, though, we don't do too badly —looking at the April 1959 S.W. Mag., a nice new Tiger TR300 AM rig and a 888A to go with it set you back £310.0.0. SSB Tx's of course, were much more expensive then! ! Think what you can get today for that kind of money and you'll agree that Amateur Radio prices haven't done too badly.

For example, cheaper than the TR300 AM rig by itself, I can flog you a complete Inoue. £180.0.0 to be exact for Rx, Tx and PSU. At least I think I can flog you one—at long last it is beginning to dawn on you chaps that this Inoue is pretty good and I can foresee shortages, but another shipment is imminent. Failing the complete rig, how about the Rx by itself for £85.0.0.

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Prefer separates? Then the FR500 Rx and FL500 Tx are worth a butcher's hook. Or the Star series, SR700 and ST700. With these you shouldn't need a linear. In fact I advise all my customers that spending the linear loot on a good tower and beam gives much better value for money. (Fool that I am, I don't sell towers, beams etc!) But if you must have a linear, I can flog you a Sommerkamp FL2000.

Incidentally, I should make it plain that the above stuff, (except the Sommerkamp FT-250) is all ex stock for immediate delivery at the time of writing. None of this "will get one for you, sir, only take a day or two". We have 'em in stock—we may even have the FT-250 in stock by the time you read this.

If your wallet won't stretch to a new rig, we usually have a pretty good stock of second hand stuff—and as we are very fussy about what we sell, it will be excellent, fully recommended stuff at a reasonable price. I make no claims for "fantastic bargains", "stupendous value" or some other advertising nonsense—just reasonable prices. You get what you pay for. If it is rubbish (and there's some about!), I'll tell you so and it will be reflected in the price. Anyway, if you want something s/hand, give us a yell.

In the line of "goodies", I would just mention that the following are especially singled out for praise——2m converters, katsumi keyers, Teisco mikes, Medco L.P. filters.

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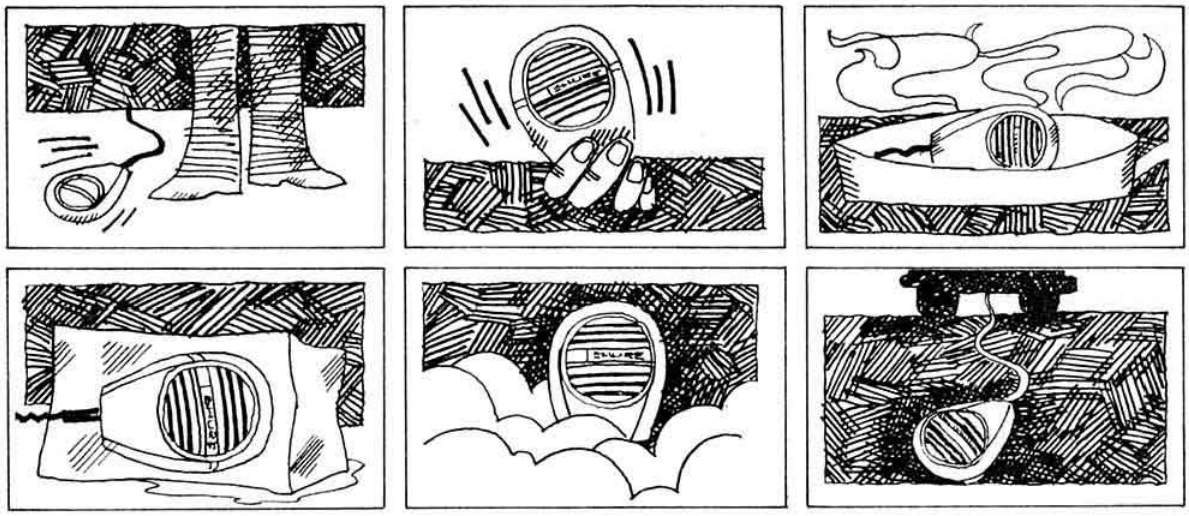

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AMATEUR RADIO NEWS

Reciprocal Licensing with Switzerland

Since 1 April 1969 the Swiss PTT have issued temporary licences to visitors under the following conditions:
1. Fixed, portable or mobile operation is allowed.
2. The anode dissipation of the final valve(s) must not exceed 100 watts (CCS)
3. The licence is valid for three months.
4. Call signs will be issued in the series HB9XAA, etc.
5. Applications must be made on forms obtainable from Generaldirektion PTT, Radio and Fernsehabteilung, CH-3000, Berne, Switzerland. A photocopy of the applicant's national licence must accompany the application.
6. The fee payable is 35 Swiss francs.
7. All applications must reach the Swiss PTT at least one month before the date on which the licence is required.

Stolen Equipment

A Swedish visitor, G5AJR/SM5CKL, had his car and mobile installation stolen from Claremont Square, London, N1 on 10 May between 1 and 2 pm. The car was a white Ford Cortina GT number GLN 685C. This contained a KW2000A transceiver and KW dc power supply. The car had a Newtronics Spring Mount fixed to the rear right wing. Anyone with any knowledge of the radio gear or the car is asked to contact the police or Dag Fjellner, G5AJR, at 21 Claremont Square, London, N1.

Club News Items

Club Secretaries are requested to send their items to their Regional Representatives and please *not* to RSGB Headquarters. We are getting dozens of bits and pieces which have to be carried into the main reports and this takes a great deal of time. We are, of course, quite happy to receive a confirmation of what has been sent to the Regional Representative.

Better Buying Service

Members belonging to the BBS may like to know that the ordinary scheme of free membership has been discontinued and that only the Premium scheme with a membership fee of 2 guineas per annum is now available.

Visiting USA

A Message of Fraternal Greeting from RSGB President John W. Swinnerton, G2YS, was read at the ARRL New England Convention at Swampscott, Massachusetts, on 24–25 May, by Mr Douglas Bryne, G3KPO, Area Representative for Peterborough and Honorary Secretary of the Peterborough Radio and Electronics Society. He also conveyed Messages of Fraternal Greeting from the Mayor of Peterborough to the Town Clerk and Mayor of Peterborough, Ontario, and from the Mayor of Boston, Lincolnshire, to his opposite number in Boston, Massachusetts.

RAEN and 70 MHz

RAEN Groups will be interested to learn that, as a result of an approach from the RAEN Committee through the Society's GPO Liaison Committee, the restrictions governing use of the above band for RAEN purposes have been lifted and the appropriate Footnote to the Schedule of the Amateur Sound Licence A is deleted as from 16 May, 1969.

The above action will give RAEN more breathing space but Groups are asked not to spread over the band immediately. The RAEN Committee are formulating plans for the proper use of this new facility and Groups will be advised and asked for their comments as soon as possible.

Radio Amateurs in the North-West of Scotland will be glad to hear that the frequency restriction also imposed under footnote 3, has been lifted.

Society Representation

Area Representative—SOUTHAMPTON
M. M. D. Smith, G3GOY, 20 Walnut Grove, Millbrook, Southampton.

Affiliated Societies

The following Societies are now affiliated to RSGB.

HOOVER (MERTHYR) RADIO CLUB
SECRETARY: F. E. Tribe, Hoover Ltd., Pentrebach, Merthyr Tydfil, Glamorgan.

GDX CLUB
SECRETARY: B. J. Stork, G3VUU, 20 Oakdale Ave., Wisbey, Bradford 6, Yorks.

NEWCASTLE-UPON-TYNE POLYTECHNIC RADIO AND ELECTRONICS SOCIETY
SECRETARY: M. E. Morey, G8BXF, Ellison Place, Newcastle-upon-Tyne, NE1 8ST.

RAF WYTON AMATEUR RADIO AND ELECTRONICS CLUB, G3MMH.
SECRETARY: F/S M. G. Hudson, G3LEJ, RAF Wyton, Huntingdon.

GILWELL PARK AMATEUR RADIO SOCIETY
SECRETARY: T. A. Barnett, G8BAM, 7 Cochrane Court, Leyton, E10.

Change of Secretary/Representative

WEST KENT AMATEUR RADIO SOCIETY,
N. D. Peacock
13 Correnden Road, Tonbridge, Kent.

ENGLISH ELECTRIC (STAFFORD) RADIO AND ELECTRONICS SOCIETY
R. Mathews, G3RLH,
Association Hall, Stychfields, Stafford.

RAF GIBRALTAR AMATEUR RADIO CLUB
Lt. Cmdr. P. J. Patrick, RN, ZB2BO,
RAF Gibraltar, Flat 9, Sandpits, Married Quarters, Gibraltar.

CAMBRIDGE UNIVERSITY WIRELESS SOCIETY, G6UW,
S. C. Cripps, G3TPF,
Jesus College, Cambridge.

Cornish Amateur Radio Club

The new Hon Secretary of this club is now Mr J. Farrar, G3UCQ, " Elm Cottage," Ventonleague, Hayle, Cornwall.

G2BSA Memorial Fund

This Fund was instituted at the request of many operators on 80m to provide a suitable Memorial in memory of our late colleague, Douglas, G2BSA; he was, I venture to suggest one of the most consistent and outstanding operators on 80, always ready to advise and help in any way he could the newly licensed. He took a great interest in the short wave listeners and gave them every encouragement to obtain transmitting licences.

Knowing it was the desire of the Founder of The Cheshire Homes, Group Captain Cheshire VC, DSO, DFC, to see all homes linked by Amateur Radio combined with the fact that Douglas also took a keen interest in the Homes, the Committee decided as a step towards achieving this we would try and supply what Homes we could with a suitable receiver.

In reply to a circular letter to all Homes inviting applications for a Receiver four Homes applied, namely, the Homes at Kirkton, Dumfries; Barnetby, Lincoln; Greatham Liss, Hants and at Wimbledon, SW20.

The receiver selected by the Committee was the *Heathkit K/RAI*, Amateur Bands Receiver, these were brought in kit form to get the best out of the money available with construction already arranged with a member of the committee, G3WDQ with the help of friends. Daystrom Limited allowed a discount of 7½ per cent on equipment bought; at one time is seemed that we would have to disappoint one Home but a SWL who heard of this offered a further donation of £25 if we could raise the remainder, a very gracious act indeed. He desires to remain anonymous.

The Fund was closed on the 10 February. Total amount in the Bank was £163 15s 7d and with this we were able to give to the four Homes a receiver and matching speaker which cost £156 4s. A charge of 1s 6d was made by the bank for the transfer of this amount to Daystrom, Limited.

A balance of £7 10s 1d remains out of which an insurance cover will be taken out to cover damage or loss, etc during transit to the respective Homes, transport has been arranged and also the installing of the receivers, aerials, etc. Whatever remains of the balance will be dealt with by the committee.

I would like to thank, on behalf of the committee, all who helped so much to achieve what we set out to do (the sum of £56 6s 6d was donated by short wave listeners), our grateful thanks to you all.

G3VUC

Amateur Radio Call Book

The 1969 edition of the *RSGB Amateur Radio Call Book* is now out of print. The 1970 edition is scheduled for publication this September.

Silent Keys

It is with sorrow that we must record the passing of the following radio amateurs.

C. S. Norman, G3FCY, of Hull, Yorks.

R. Pearce, K5QWZ/G3XBV, of Oklahoma City, Okla.

A. D. Yager, K8JBN, of Clyde, Ohio.

T. J. Evans, G2DFX, of Eynsham, Oxford.

D. W. Atkinson, of Bournemouth, Hants.

John Brennan, G3WVB, of Harrogate, Yorkshire.

D. J. Saunders, BRS25454, of Southport, Lancs.

Royal Signals ARS Presentation

Last month we reported the presentation of a plaque by the Royal Signals ARS to RSGB. It is regretted that a number of errors appeared and thus a corrected synopsis of the presentation follows.

On Monday 14 April, Brigadier Brindley, President of RSARS, presented to RSGB President, John Swinnerton, G2YS a plaque commemorating the cordial relationship both societies have enjoyed and in recognition of the service provided by Radio Amateurs. Also representing RSARS were Major General E. S. Cole, a Past President of RSGB, and Major D. Barry, G3ONU, Secretary RSARS.

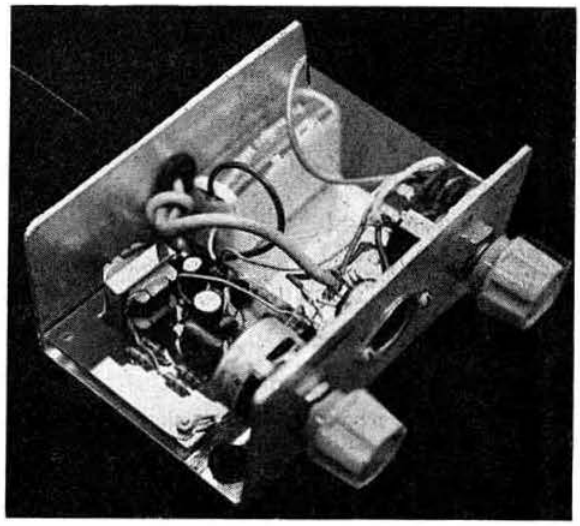
The RSGB News Bulletin Service

Every Sunday morning the RSGB News Bulletin, (GB2RS), is broadcast. The News Bulletin can be received on either vhf or hf, which gives almost complete coverage of the British Isles. It keeps radio amateurs informed about the latest happenings in the world of Amateur Radio and gives notice of future events.

This is the schedule for the RSGB News Bulletin:

Time (BST)	Frequency (MHz)	Location of Station
09.30	3·6	SE England
	145·1	SE England (beaming N)
10.00	3·6	Severn Area
	145·1	SE England (beaming W)
	145·8	Aberdeen (beaming W)
10.15	145·8	Belfast
	145·8	Belfast (beaming S)
10.30	3·6	N Midlands
	145·8	Aberdeen (beaming SW)
	145·3	Birmingham Area (beaming NW)
11.00	3·6	NW England
	145·3	Birmingham Area (beaming SW)
11.30	3·6	SW Scotland
	145·5	Leeds (beaming N)
12.00	3·6	NE Scotland
	145·5	Leeds (beaming E)

Exhibitions—Beacons—Conventions—Contests—Local Events Rallies — Scientific Projects — Meetings — Licensing — Clubs Propagation Reports—Lectures—Field Days—Expeditions.



A Simple Speech Compressor

By P. CAREY, G3UXH*

Opinions on the value of speech compressors vary between different operators. The unit to be described was assembled and used in conjunction with a KW2000 transceiver. The results were entirely satisfactory and the use of the compressor is believed to have contributed considerably to the communication capability of the station.

THE idea of the compressor was provided by Roger Ries, W9FIU, and subsequently the complete circuit was obtained mounted on a board of less than 2 in by 2 in. This was installed in a metal cabinet and fitted with switch, plugs and battery. The general layout can be seen from the illustration.

Construction

Comments from the originator of the circuit include the suggestion that for proper operation the voltage at the drain of the 2N3819 should be 10 volts ± 3 per cent. Some selection of these transistors may be necessary. Alternatively, the value of the source resistor could be varied but care should be taken to keep this between 1·5 K and 4 K ohms. The MPF102 and MPF103 should also function satisfactorily in the circuit although the source resistor may require alteration.

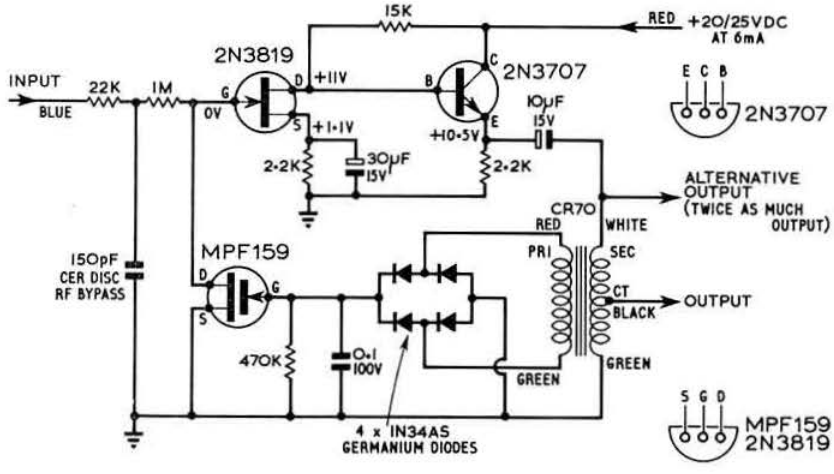
Input and output of the compressor is high impedance. The current drain is 6mA when using a 22·5 V battery. For those who may prefer to use a mains powered power supply a suitable circuit is given.

Use

The writer has made no attempt to analyse the theoretical performance of the compressor. It was built, used and found

Continued on page 385.

* 29 Miskin Road, Hoo St. Werburgh, Rochester, Kent.



An exact equivalent to the MPF159 device is the MFE159 which is available from Newark Electronics Mail Order Division, 500 North Pulaski Road, Chicago, Illinois, 60624.

Fig 1. Circuit of the unit as suggested by W9FIU. Critical dc voltages are indicated. The transformer is a CR-70 Calrad type, 10 K ohms to 20 K ohms centre tapped.

Two Metre MOSFET Converter

By A. L. MYNETT, B.Sc., G3HBW

THIS two-metre converter was produced to fill the need of the local Chesham and District Radio Society for a very simple, cheap and sure-fire design. It was never intended to feature a limiting sensitivity although, using modern devices, it has been found possible to achieve a noise figure below 2dB. Using only three transistors, the insertion gain of the converter is about 30dB (spread from 28 to 35dB) and the rejection of small-signal spurii (including i.f. interference but not image) is never worse than 60dB.

The unit is intended to be run from a 9 volt positive supply (negative ground), although details of an alternative, "inverted" design are given. The total cost, if every item is purchased, will be in the region of £3 although few people will find it necessary to spend more than £2 altogether.

Circuit Arrangements

The advent of cheap, low noise dual-gate MOSFET's (RCA 40600 series), combined with the availability of American surplus miniature crystals in the 70 MHz region, solves the oscillator and mixer problems of this converter design completely (Ref. 1). Unfortunately, their relatively rather high noise level makes these MOSFET's not really suitable for the RF stage; devices of the same type which have a sufficiently good noise performance are very expensive. However, the cheap and satisfactory bipolar BF180 comes to the rescue, giving rise to a very stable, low-noise RF amplifier in a common-base circuit. (Bouquets are due to G8AMA for extolling the virtues of this particular transistor, apparently well-known to everybody but myself for its excellent performance!) The use of the bipolar device rather than of some form of FET in the input stage will degrade the out-of-band strong signal performance somewhat but the in-band performance, which is usually the vital one, is not affected as it depends almost entirely on the mixer.

Two available American surplus crystal frequencies are 69·992 and 70·992 MHz (fifth overtones) giving output tuned i.f.'s of about 4 to 6 MHz and 2 to 4 MHz, respectively, each with a calibration error of 16 kHz.

A single dual-gate MOSFET* operates as oscillator and doubler, delivering the required 1 volt rms to the second gate of the MOSFET mixer (Fig. 1(a)). Both of these stages use the RCA 40602, which retails at only about eight shillings. The signal is fed into the first gate of the mixer, an arrangement that provides the maximum conversion slope, together with good signal oscillator isolation. The gate $_1$ and gate $_2$ DC voltages w.r.t. source-substrate are $-0{\cdot}9$ and $+0{\cdot}6$ V respectively giving an average drain current of 4 mA which is close to the optimum for a suitable compromise between mixer linearity combined with allowable input-voltage handling capacity and low-noise, characterized mainly by a high conversion slope of about 2·5 mA/V.

The RF stage is standard in design, with untuned input in common-base and double-tuned output transformer coupling into the mixer. The operating conditions of the BF180 are 8·5 volts at 2·0 mA.

The local-oscillator utilizes an apparently unconventional circuit which is, however, in reality only an ordinary tuned Pierce arrangement with the tuned circuit connected to the drain and a feedback path from drain to gate$_1$ via the crystal. This circuit has been "turned upside-down" by grounding the drain at oscillator frequency instead of the source in order that a harmonic-generating tuned circuit may be connected from drain to ground. This has only a small series impedance at oscillator frequency, thus allowing the drain to participate fully in the local-oscillator action. This latter condition is essential in this type of circuit when using a MOSFET as gate$_2$ is not capable of operating effectively as a "sub-anode", as does the screen-grid in a valve Tritet circuit, because, of course, the insulated gate does not intercept any of the DC current in the channel.

The operating conditions of the MOSFET have been arranged to favour operation as a doubler, by optimizing the square-law transfer characteristic from gate$_1$ to drain. This means that operation as a trebler or quadrupler from lower-frequency crystals will not be so favourable and, if this type of operation is desired, an extra multiplier stage will probably have to be added.

The converter is basically intended for negative-chassis, positive supply operation. This has two main advantages over the other arrangement, namely that it facilitates running the unit from the HT supply of a valve receiver through a dropping resistor if so desired and also that the input circuit of the mixer may easily be very effectively decoupled at the i.f. by connecting the return lead of the input gate circuit directly to chassis. However, positive-chassis operation may be required when, for instance, working from old-style car electrical systems and, indeed, a small bonus is gained in that a few decoupling components may be saved this way. Therefore, an "inverted" circuit diagram and wiring plan are given (Fig. 2). The performance of this version of the design is the same in all respects as that of the original, apart from a very slight increase in i.f. breakthrough, for the reasons just given.

Substitution of Components

Almost any high-frequency, depletion type of n-channel dual-gate MOSFET may be used for TR2 and TR3, including the earlier and more expensive 3N140 series of RCA and probably the Mullard development type BFS28.

It is rather difficult to substitute for the BF180 in the RF

* 10 Prior Grove, Chesham, Bucks.

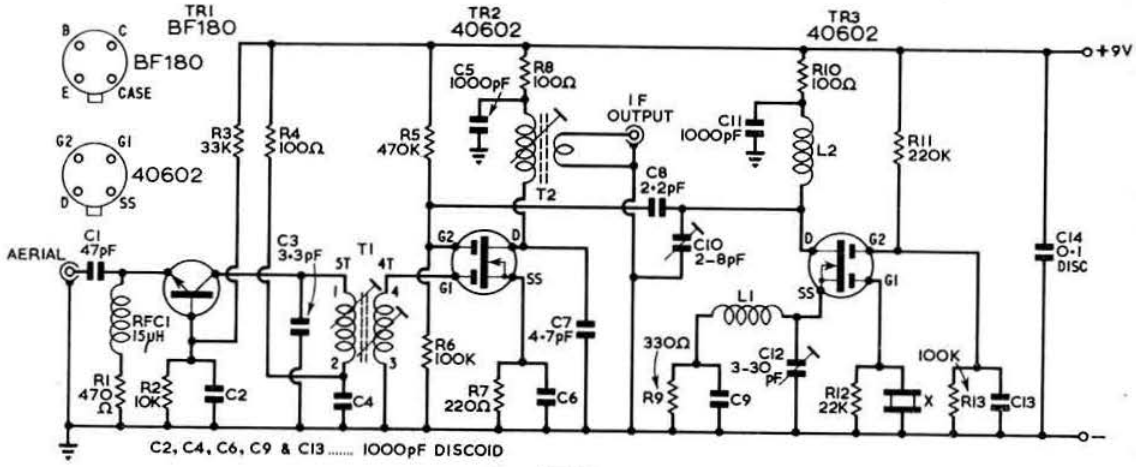


Fig 1a.

stage, TR1, because of its exceptional performance, as already mentioned. The particular requirement is for an npn silicon planar transistor with a cut-off in the region of 500 or 600 MHz and very low collector-emitter feedback capacitance.

If difficulty is experienced in obtaining the discoidal feedthrough capacitors, standard 1000pF solder-in components may be used with probably not much change in performance, although this has not been tried.

The miniature 15 μH choke may be replaced by a home-made one, if desired. About 35 turns, 36 swg enam. close-wound on an $\frac{1}{8}$ in dia resistor, of value not less than 10 K ohms, will serve.

The output i.f. transformer T2 can use almost any tuned primary type of transformer, with a turns ratio to the untuned winding of between 7 to 1 and 15 to 1. Primary inductances required are about 420 μH for the 2 to 4 MHz i.f. and 140 μH for the 4 to 6 MHz i.f. The stray capacitance of the tuned winding should of course be small.

Construction

The converter is intended to be made on a simple flat-plate type of chassis, with a dividing screen mounted at right angles to it. (Figs. 2 and 3.) The chassis and screen may be constructed from any suitable material including aluminium or brass sheet or the cheap and effective copper laminate. Wherever possible components are soldered directly to the chassis. The prototype converters were made from the last-named material, which also facilitated the use of solder-in discoidal bypass capacitors in critical positions. These components have a much lower inductance than conventional feedthrough capacitors and are greatly to be preferred at VHF and even more so, incidentally at UHF.

Note that the position of one of the discoidal capacitors is changed if the positive-ground version of the converter is being built; hole position "1" in Fig. 3 is correct for the normal negative-ground system but hole position "2" should be used for the positive ground arrangement.

The RF stage and mixer are situated on one side of the screen (if laminate is in use, on the copper-clad side), with the oscillator on the other. Three PTFE feedthroughs are mounted in the screen, two for carrying supply voltages and the centre one for accommodating the local-oscillator coupling lead. Standard Belling-Lee coaxial sockets serve as input and output connectors. The BF180 has its case isolated from its electrodes and is conveniently mounted in a hole in the chassis, with the case lead independently grounded. It should *not* be soldered into the hole of course! The 40602 MOSFET has the source and substrate tied to the case internally and so the two MOSFETs are supported in the wiring, to avoid grounding the cases. The major support for each is the very short wire connecting to the bypass capacitor, from the mixer source lead and the oscillator gate$_2$ lead.

The output i.f. transformer is a standard, cheap commercial item, actually intended for use in valve receivers. It is tuned by a small capacitance to obtain the required low operating Q and therefore large bandwidth, combined with a large resonant impedance. It is supported by fixing one of its leads and also the spring clip at the top of the former to the chassis. The inter RF stage-mixer transformer is wound on a single Aladdin $\frac{1}{2}$ in dia former. The windings are first formed on a $\frac{1}{4}$ in rod and then sprung on to the former, one at each

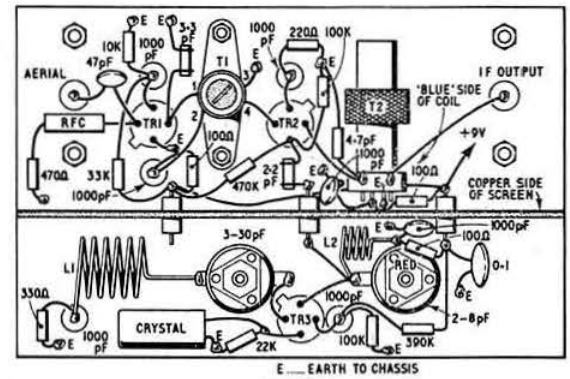


Fig 1b.

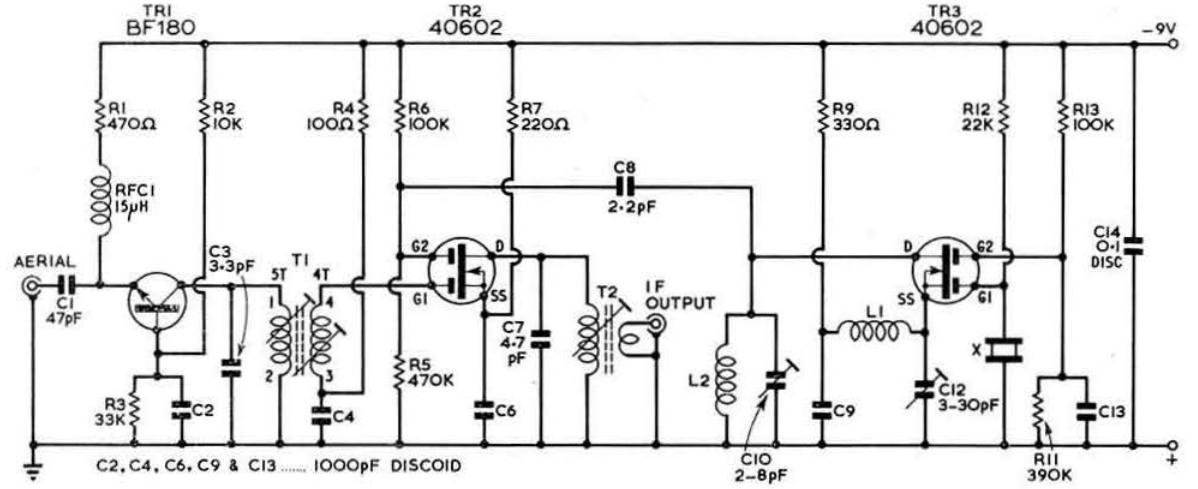
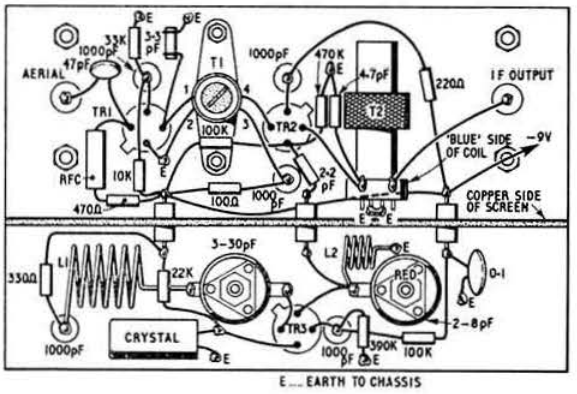
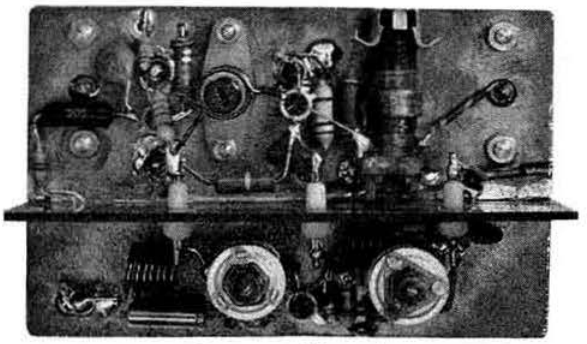


Fig 2a.



E .... EARTH TO CHASSIS

Fig 2b.



Component Layout

Coil Table

L1 6½ turns 22 swg enam., close-wound, air-spaced (wound on ⅛ in drill.)

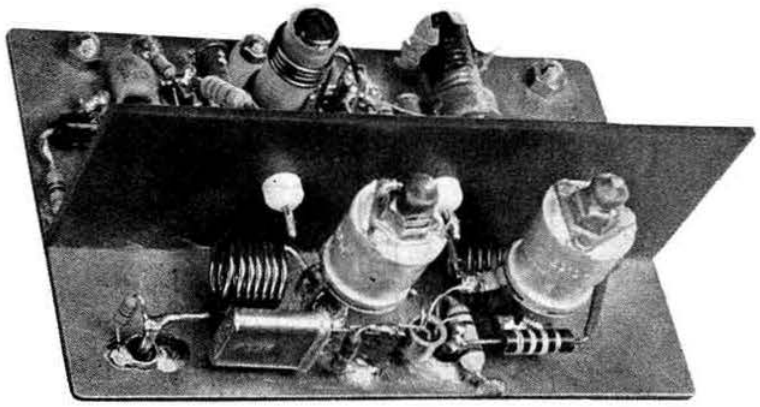
L2 5 turns 22 swg enam., close-wound, air-spaced (wound on ¼ in drill.)

T1 primary 5 turns 22 swg enam., close-wound on ¼ in drill, and then sprung on to Aladdin former.
secondary 4 turns 22 swg enam., close-wound on ¼ in drill and then sprung on to Aladdin former.
(order of winding leads indicated on circuit diagram, "1" being nearest to the chassis.)

T2 Osmor type QO9 coil for 2 to 4 MHz i.f. (70·992 MHz xtal.)
Osmor type QA8 coil for 4 to 6 MHz i.f. (69·992 MHz xtal.)

Components List

C1,	47pF ceramicon.	Erie type CDFT/100. (Electroniques).
C2, 4, 6, 9, 13	1000pF Discoidal feed-through capacitor	
C5, 11	1000pF disc ceramic.	
C3	3·3pF ceramicon	
C7	4·7pF ceramicon	
C8	2·2pF ceramicon	
C10	2 to 8pF Philips trimmer	
C12	3 to 30pF Philips trimmer	
C14	0·1 μF Transcap (disc ceramic)	
R1	470 ohms	
R2	10 K ohms	
R3	33 K ohms	
R4, 8, 10	100 ohms	
R5	470 K ohms	
R6, 13	100 K ohms	Note: R8, R10, C5 and C11 are not required for the positive ground version.
R7	220 ohms	
R9	330 ohms	
R11	220 K ohms	
R12	22 K ohms	
T1	¼ in dia polystyrene Aladdin former with two dust cores (see text).	
T2	Osmor Type "Q" Coil (see Coil Table.)	
TR1	BF180 (Henry's of Edgware Road).	
TR2, 3	40602 dual-gate MOSFET (apply to RCA Ltd for address of local RCA agent).	
X1	approx 70 or 71 MHz HC-18/U miniature overtone crystal according to i.f. (see Coil Table). (Jan Crystals, 2400 Crystal Drive, Fort Myers, Fla, USA)	
RFC1	15 μH miniature RF choke, Painton or STC, or similar component wound on high-value resistor.	
	3 PTFE feed-through insulators.	



Crystal Oscillator is clearly shown lower left.

end. The coils are each tuned with a standard VHF type dust slug. The shiny black Neosid material (Grade 910) is best but Grade 901 (yellow) or even 900 (violet) will do. The numbers against the coil leads in the diagram refer to their order on the coil former, "1" being nearest to the chassis.

The oscillator-multiplier stage is confined entirely to one side of the screen. L1 is tuned to the overtone frequency by the 30 pF Mullard concentric trimmer and L2 to the second harmonic by the 8 pF trimmer. Both L1 and L2 are air-spaced and supported by their respective trimmers at one end and by grounded components at the other. The centre (earth) connections of the trimmers are pushed into small holes in the chassis (if brass or laminate) prior to being soldered, for extra mechanical support. The HC-18/U miniature wire-ended crystal is soldered directly to the chassis at one end. When soldering to the crystal wires, *it is essential to use a thermal shunt* as, otherwise, the crystal connections inside the can may drop off.

The 0·1 μF Transcap C14 is a precautionary measure, to help prevent i.f. interference being picked up on the power leads; it was not found necessary in the prototype converter and so is not shown in the photographs.

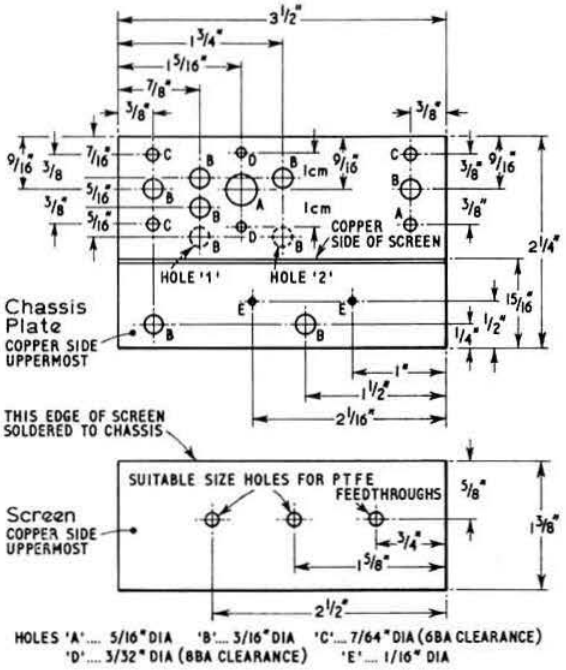


Fig 3.

Alignment of the Converter

Lining up the converter is extremely straightforward, only four tuned circuits being involved. C12 should be adjusted until the oscillator starts. A check with a wavemeter will confirm the frequency although there is little chance of incorrect operation with the circuit component values shown. Next, C10 is tuned until the second harmonic appears (at about one-half of maximum capacity). Between 0·7 and 1·2 volts RMS should be measurable at the mixer gate$_2$. A setting of C12 will be found (at about two-thirds of maximum capacity) which will combine reliable oscillator starting with a satisfactory oscillator injection level. Then, peak the i.f. coil T2 for maximum noise at the i.f. band centre. Tuning the secondary of T1 will be found to result in two noise peaks corresponding to the wanted signal range and the image. Select the higher-frequency of the two and then adjust the primary of T1 for an enhancement of the noise peak. Minor trimming adjustments may now be made on a signal generator or actual signals and the alignment is complete.

Uses and Handling of Dual-Gate MOSFET Devices

The dual-gate MOSFET is really a combination of two separate single-gate MOSFETs with their channels connected in series. Thus both gates have control of a mutually dependent kind over the current flowing in the composite channel, i.e. from source to drain. The device behaves rather like an old-time screened-grid valve except that the gates, being insulated from the bulk material, do not pass any DC and so there is no "partition noise" penalty in amplifier or mixer service. The control slope from gate$_1$ to drain is normally greater than that from gate$_2$. A 10 mA/V gate$_1$-to-drain and gate$_2$-to-drain slope of about 2 mA/V occur simultaneously for the RCA 40602 device, with a supply of 10V at 10 mA.

The dual-gate MOSFET has advantages over single-gate devices in both mixing and amplifying applications. As an amplifier, the $gate_2$ may be RF grounded, greatly reducing output-to-input feedback capacitance, typically 0·02 pF. A very satisfactory gain-control characteristic may be achieved by varying the $gate_2$ voltage to source, with, unlike other FET's, an improvement in strong-signal handling capacity as the gain is reduced. As a mixer, it is convenient to have two separate electrodes available for local oscillator and signal injection. The signal is usually fed into $gate_1$ to achieve the best conversion slope, which is about 2·5 mA/V for the 40602. A very good, linear, mixer performance is easily obtained under practical working conditions and this fact is, of course, exploited in the present design.

Because, in MOSFET devices, the gates are insulated from the bulk material by a layer of glasslike material only a few microns thick, they are known to be more susceptible to damage by voltage breakdown resulting from exposure to stray electric fields than are junction-gate FET's, such as the 2N3819, in which, as the name implies, the gate-channel region is really a reverse-biased junction diode.

Originally, the writer handled all MOSFETs with great care and circumspection, dutifully shorting the four leads together with fine wire prior to removing the brass collar with which each is supplied and only removing the wire when all leads were soldered into position in the circuit. However, after an enjoyable hour-long experimental session, in which deliberate attempts were made to "blow up" many samples of the RCA 40600 and 40602 by the equivalent of careless handling, but without success, these precautions have been abandoned and none of the 50 or so FET's handled since then seems to have suffered in any way! Other MOSFET types are available on the market (by General Instruments) in which the gates are protected by back-to-back zener diodes but these do not seem to be very attractive at present apart from special applications in which very high voltage overloads may have to be withstood because:

1. The noise performance is degraded by the presence of the diodes.
2. The variation in the depletion layer width of each diode and therefore of its capacitance as the applied voltage is varied must introduce some non-linearity in operation.
3. The price per unit is nearly doubled.

Results and Performance

The little converter has proved to give a very stable and satisfactory performance under all sorts of conditions, including the use of such diverse i.f. tuners as AR88's, Command Receivers and an old broadcast set! It is insensitive to supply voltage changes within the range of from 6 to about 15 volts, apart from a few dB change in gain and no tuning re-adjustment is required when the antenna impedance is changed slightly. The strong-signal performance is as expected when fed into a reasonable i.f. tuner and even stations only a few hundred yards away produce no significant blocking effects.

Ref 1: Two Metre MOSFET Converter, D. J. Taylor, G8ARV, page 464, July 1968.

Modifications to Converter for Four Metre Operation

The following changes are required to convert the basic Two Metre design to Four Metres.

1. Replace the 70 or 71 MHz crystal by a 33·0 or 34·0 MHz crystal to obtain band coverage with 4·025 to 4·700 MHz and 2·025 to 2·700 MHz tuned i.f.'s, respectively.
2. Replace the 2 to 8 pF trimmer, C10 by a similar 3 to 30 pF component.
3. Replace C3 by a 22 pF tubular ceramic or polystyrene capacitor.
4. Add C15, a 15 pF tubular ceramic or polystyrene capacitor, from the mixer $gate_1$ to ground.
5. Add C16, a 68 pF tubular ceramic or polystyrene capacitor, in shunt with the oscillator trimmer, C12.

No modifications will be required to the coils.

The performance of the converter on Four Metres will be found to be very similar to that of the Two Metre Unit. The correct settings of the trimmers are C10, ¾ way in and C12, ½ way in.

G3HBW MOSFET Converter Kit

A *complete* kit of parts for the converter just described will be available in a week or two. The kit will include all components plus printed circuit board. Please state positive or negative earth when ordering.
Price £4 5s i.f. 4–6 MHz.

A. C. Mansell, 46 Headley Road, Woodley, Reading, Berks.

A Simple Speech Compressor

continued from page 380

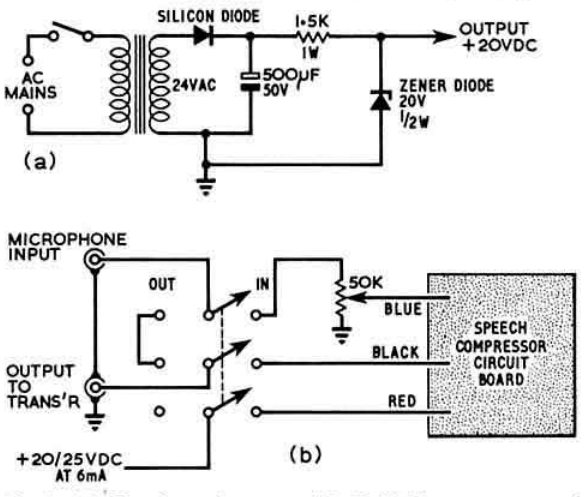


Fig 2. (a) Simple mains psu. (b) Switching arrangement allowing the compressor to be inserted or removed from the microphone circuit. A 50 K ohm potentiometer was used with the writer's BM3 microphone.

to be satisfactory. On this basis the circuitry may be of value to other operators. For further information on clipping and compression and methods of use and adjustment the reader is referred to Chapter 9 of the *RSGB Radio Communication Handbook*.

EQUIPMENT REVIEW

By B. ARMSTRONG, G3EDD and
P. SIMPSON, G3GGK

The Trio JR-500SE Communications Receiver

FOR only the second time in this series of technical reviews a low cost communications receiver has been offered. It is perhaps not fully appreciated by many users that any equipment which is offered on the amateur radio market has some short comings; some have more than others. A hard fact of life is that one gets what one pays for. Professional receivers are sold for up to £1000 and it is completely unreasonable to expect to buy a receiver for £100 or even £200 which can match the professional equipment. The fact that there are short comings does not mean that a particular receiver should be avoided. It has been said by at least one supplier that if any shortcomings are pointed out in a review, the equipment is damned. This, if it is true, shows not only an unreasonable attitude by the prospective purchaser, but a complete lack of understanding. The reviewers would like to think that if a supplier refuses to offer an equipment for review it is because he knows it has more problems than usual.

The Trio JR500SE has been offered for review by: Amateur Electronics, 518-520 Alum Rock Road, Alum Rock, Birmingham, 8. The sole U.K. trade distributors for TRIO equipment including the JR500SE are Messrs B. H. Morris & Co. (Radio) Limited, 84-88, Nelson Street, London, E1 from whom literature can be obtained free on request.

The price is £68. The Trio JR-500SE is manufactured in Japan and the reader should bear in mind the comparative price of other receivers when examining results of the tests.

General Description

The electrical circuit follows conventional lines with a crystal controlled first mixer, a first i.f. of 8·5-9·1 MHz and the main selectivity at 455 kHz. The transistor VFO tunes from 8·4465 to 9·0465 MHz. These frequencies may appear to be a little odd but the reason is that Trio define, by inference, an ssb channel frequency as the centre of the passband and not by the carrier frequency which is suppressed.

This may sound unconventional, but in fact several national administrations use a similar definition which creates some international problems. Apart from the two transistors in the vfo, the JR-500SE uses valves. The power supply uses a half wave silicon rectifier with RC smoothing. There is no voltage regulation apart from a Zener diode in the vfo. Only one sideband is provided, the correct one to suit the amateur convention is picked out by putting the first mixer crystal either above or below the wanted frequency.

The 455 kHz selectivity uses two simple mechanical filters with piezo transducers.

Split gear drive for the vfo gives 50 kHz per revolution. The tuning knob skirt is divided into segments for one kHz per division; it can be rotated without moving the gear train for calibration. Although no 100 kHz calibrator is provided, a switch for this is on the front panel, and a suitable circuit is given in the handbook.

The aerial connection is via two screw terminals, a hole for an S0239 UHF Series coaxial socket is alongside. Other connectors on the rear panel are 8Ω and 500Ω from the output transformer, a phono socket connected to the vfo output, a slide switch to adjust the mains transformer tap from 115 to 230 vac and an octal socket to provide external connections to a companion transmitter.

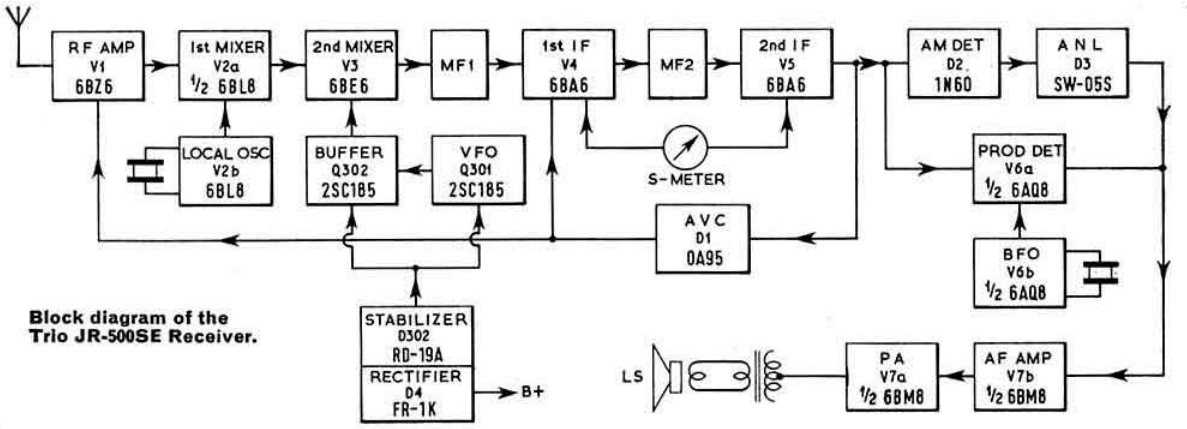
All steel construction is used and the equipment is well made. The case is hammertone dark grey and the front panel is dark green.

Five of the seven bands have a tuning direction with frequency calibration increasing in an anticlockwise direction on the main dial. On 3·5 and 7 MHz calibration is in the opposite direction. Calibration starts from 0, with the result that the actual tune frequency calls for simple mental arithmetic on bands not starting with a round figure i.e. 3·5 MHz and the upper 28 MHz bands starting at 28·5 and 29·1 MHz.

The Tests

VFO

With no crystal calibrator, the vfo could not be set up to a particular frequency. Consequently the main dial and tuning



Block diagram of the Trio JR-500SE Receiver.

knob scale were mechanically aligned and the vfo frequency measured at 50 kHz intervals.

Dial readings (kHz)	Error (Hz)
0	—2720
50	—4913
100	—3075
150	—3748
200	—3480
250	—3231
300	—1285
350	+ 656
400	+1239
450	+ 906
500	+ 137
550	—1186
600	—4281

Backlash was masked to some extent by slight springiness when tuning in one direction and was about 500 Hz, resettability in one tuning direction was very good—less than 70 Hz; in the other direction it was 2–300 Hz due to the springiness.

Frequency drift from switch on was recorded as follows:

Time from switch on (Minutes)	Frequency drift (Hz)
1	— 941
2	—1382
3	—1652
4	—1852
5	—2020
10	—2506
15	—2748
30	—3278
45	—3444
60	—3517

Frequency change for ± 10 per cent mains supply was less than 100 Hz. During vfo testing it was observed that terminating the external vfo socket in 50Ω results in approximately 500 Hz shift.

Spurious Responses

Spurious responses were on the whole quite good—over 60dB down. On the upper three bands 14, 21 and 28 MHz the second i.f. image was 35–40dB down and could be peaked with the pre-selector control. First i.f. (9·0 MHz) break through was, as could be expected only 38dB down on the lower end of the WWV (10 MHz) band.

Selectivity

The measured selectivity was considerably better than the 4 : 1 shape factor claimed. 2·5 : 1 was measured, and more closely tied up with a selectivity curve illustrated in the handbook.

The Crystal Oscillators

No trimming is provided on any of the crystals, but this is common to many more expensive receivers.

Crystal Frequency (MHz)	Error (Hz)
20·2	+158
19·6	+350*
19·1	— 45*
12·1	+578
5·1	+942
16·4	+825*
12·9	+346
0·4534	+100

* Slightly unstable reading.

Since there is no ht regulation the crystal frequencies were checked at ± 10 per cent mains voltage.

Apart from the 19·6, 19·1 and 16·4 MHz crystals the alteration with mains voltage was not worth recording. The exceptions showed an alteration of about ± 200 Hz. The variation was investigated since it was noticed that audio quality varied with rf gain on some bands. This was traced back to the dependence of ht volts on the load presented by the rf gain controlled stages.

Signal to Noise Ratio and Sensitivity

The following results were recorded with 1 μV pd input:

Frequency (MHz)	Signal/Noise (dB)		Audio O/P (mW)	
	SSB	AM	SSB	AM
3·8	23	13	400	300
7·1	21	13	400	450
14·1	23	12	400	320
21·1	22	12	400	200
28·6	18	12	400	350
10·0 (WWV)	18	8	400	200

Note: AM input was at 30 per cent modulation with 400 Hz.

The claimed maximum power output is 1 watt. This was easily attainable but above 200 mW the output was some-

what distorted. However 200 mW is a more than comfortable listening level.

Strong Unwanted Signal Handling

Blocking was measured by two signal generators. One was set to the receiver tune frequency such as to produce 14dB signal-to-noise ratio. The second signal generator was set 10 kHz from the tune frequency and its level increased until the signal-to-noise ratio was degraded by 3dB. The unwanted signal necessary was +78dB rel 1 μV PD.

Intermodulation was measured by feeding in two strong signals 10 kHz apart and looking for intermodulation products 10 kHz above the upper frequency and 10 kHz below the lower frequency. The unwanted signals were +56 dB relative to 1 μV PD to produce the equivalent of 1 μV at the aerial input.

These results were good bearing in mind the simple circuit of the receiver.

AGC

The agc was considerably better than some far more expensive receivers although not as good as some others.

Signal Input relative to 1 μV PD	Audio O/P Relative Test Level
+20dB	+ 8
+40	+11
+60	+24
+80	+25

S Meter

The "S" meter zero was stable and the movement was very sensitive to rf input. The following results were measured:

Meter reading	dB relative 1 μV PD at 14·1 MHz
S1	— 7
S2	— 1
S3	+ 3
S4	+ 7
S5	+11
S6	+14
S7	+17
S8	+21
S9	+26
S9 +10	+31
S9 +20	+38
S9 +30	+44
S9 +40	+49

The variation with band showed:

Frequency (MHz)	dB Relative 1 μV PD to show S9
3·8	+26
7·1	+23
14·1	+26
21·1	+27
28·6	+26
10 (WWV)	+29

The S meter measurements were quite consistent and deserve a better instrument than the very small edgewise type used.

Birdies

7, 14, and the lowest 28 MHz bands were birdy free. A very small number of birdies in the other bands were at very low level.

Handbook

The twelve page printed handbook is well produced and demands no particular comment. In common with most other handbooks there is no parts list, but component values are given on the circuit.

Guarantee

Amateur Electronics state that they guarantee the equipment for one year.

On the Air

It was interesting to operate the Trio JR500SE alongside another Japanese receiver selling for almost twice the price. Only on 7 MHz was it easier with the more expensive receiver to sort out a weak ssb signal. The cw man will miss cw selectivity and the lack of a crystal calibrator when working near band edges. The S meter which is cramped into the dial window is very small and the numbers on it are extremely small. Since the agc has very little "hang" the S meter is not very reliable on an ssb or cw signal.

The main tuning control is very light and the review equipment had the characteristic of returning by a division after tuning in a clockwise direction. This did not show up as a tuning shift but only as a shift of the control itself.

The slight variation of crystal oscillator frequency with rf gain showed up in use as a change of received audio frequency response.

The only "oddy" observed was under certain low temperature conditions in an outside shack. On 21 MHz the first crystal oscillator developed a squegging effect which pulsed a received continuous carrier. Although this obviously made cw reception very difficult, the effect on an ssb signal was surprisingly slight.

Accessories

Also supplied with the JR-500SE was the SP-5D loudspeaker and HS-4 headphones which cost £4 7s. 6d. and £5 19s. 6d. respectively.

The loudspeaker unit contains an elliptical loudspeaker approximately 2½ by 4½ in. The styling of the unit is similar to the JR-500SE except that the front panel is grey since it is primarily intended to match the 9R-59DE. Audio quality produced is adequate.

The headphones are attractively presented with a chromium plated wire headband with white PVC padding. The earpieces are adjustable and have black PVC padding which makes them very comfortable to wear.

Conclusions

There has to be a reason why some receivers are cheaper than others. The JR-500SE has no calibrator or choice of side band or cw selectivity for instance. However the tests show that a low price does not necessarily mean low performance. For all but the serious DX-er the JR-500SE would give adequate service. The writers do not have sufficient experience of similarly priced receivers to judge where the JR-500SE stands in its class.

Supplier's Comments

" We appreciate the opportunity extended to us by *Radio Communication* for the review of the TRIO JR-500SE,

particularly in view of the fact that we have sold very many of these receivers and it will therefore be of interest to our present customers, in addition to those people contemplating the purchase of this receiver. In our opinion the comments contained in the review are completely fair and factual and we would draw the attention of the reader to the point in the review where the performance of the JR-500SE is favourably compared with a receiver at almost twice the price of the TRIO, which confirms our own decided opinion that there is nothing comparable to the JR-500SE currently available on the British market in this particular price bracket. With regard to the drift figures given, it would be perhaps worth while pointing out that the maximum frequency drift occurs in the first 10 minutes warm-up period, the subsequent drift of approximately 1 kHz during the next 50 minutes being quite acceptable in our opinion. The question of crystal tolerances is, of course, the familiar one of the price factor involved."

An Improved Design Method for Pi and L Pi Network Couplers

By H. L. GIBSON, G8CGA*

More than a year ago Dr M. M. Bibby, G3NJY, submitted an article to the Society pointing out inaccuracies in the formulae used to obtain circuit data for pi-networks and suggesting alternatives. Subsequently there was discussion with members of the Technical Committee concerning several of the points involved. G3NJY moved to the USA and H. L. Gibson, G8CGA, was later asked to prepare a final draft of the text which would be suitable for publication. During this work other minor points were dealt with and the article now published was written by G8CGA inspired by the original manuscript of G3NJY.

THE purpose of the pi-network coupler is to present at its input terminals an impedance R_1 in order to load a valve or transistor amplifier correctly when the actual load connected to the output terminals of the coupler is a resistance R_2, as shown in Fig. 3.

Previous design formulae and curves have assumed X_L to be resonated by X_{c1} and X_{c2} in series, but this assumption is correct only if R_2 is much larger than X_{c2}; this condition is only approached for large ratios of R_1 to R_2. For ratios of less than 10, the error becomes quite large and this has become obvious when using the existing formulae for designing transistor matching networks.

To analyse the behaviour of the circuit correctly, it is necessary to convert the parallel components X_{c2}, R_2 into their series equivalent, to add the value of X_L and then reconvert into parallel components. To do this, the following standard conversion formulae are needed; in Fig. 1, the parallel circuit X_p and R_p is equivalent to the series circuit X_s and R_s, if,

$$R_s = \frac{R_p \cdot X_p^2}{R_p^2 + X_p^2} \quad \ldots (1)$$

$$X_s = \frac{R_p^2 \cdot X_p}{R_p^2 + X_p^2} \quad \ldots (2)$$

$$R_p = \frac{R_s^2 + X_s^2}{R_s} \quad \ldots (3)$$

$$X_p = \frac{R_s^2 + X_s^2}{X_s} \quad \ldots (4)$$

The Pi-network omitting X_{c1} is shown in Fig. 2a. The impedance between B and C consists of X_{c2} and R_2 in parallel and is equivalent to R_{s2} and X_{s2} in series as shown in Fig. 2b where,

$$R_{s2} = \frac{R_2 \cdot X_{c2}^2}{R_2^2 + X_{c2}^2} \quad \ldots (5)$$

$$X_{s2} = \frac{R_2^2 \cdot X_{c2}}{R_2^2 + X_{c2}^2} = R_{s2} \cdot \frac{R_2}{X_{c2}} \quad \ldots (6)$$

The coil reactance X_L is in series with these and X_L must be greater than X_{s2} because the total impedance between A and C must be inductive in order to tune with a capacitive X_{c1}. In Fig. 2b, we have a resistance R_{s2} in series with an inductive reactance $(X_L - X_{s2})$; this combination may be converted to the parallel combination of X_p and R_p shown in Fig. 2c, where

$$R_p = \frac{R_{s2}^2 + (X_L - X_{s2})^2}{R_{s2}} \quad \ldots (7)$$

$$X_p = \frac{R_{s2}^2 + (X_L - X_{s2})^2}{X_L - X_{s2}} \quad \ldots (8)$$

The resistive part R_p is clearly our wanted load resistance R_1, while the input capacitance to the Pi coupler X_{c1} must tune out X_p. Hence, numerically $R_1 = R_p$ and $X_{c1} = X_p$.

The loaded Q of the whole circuit is given by,

$$Q = \frac{X_L}{R_{s2}} \quad \ldots (9)$$

provided that the impedance of the source is large compared with R_1. Let us designate $\frac{R_2}{X_{c2}} = Q_2$ and $\frac{R_1}{X_{c1}} = Q_1$ remembering that R_1 is not an actual resistor, but the effect of R_2

* 132 Pine Gardens, Ruislip, Middlesex.

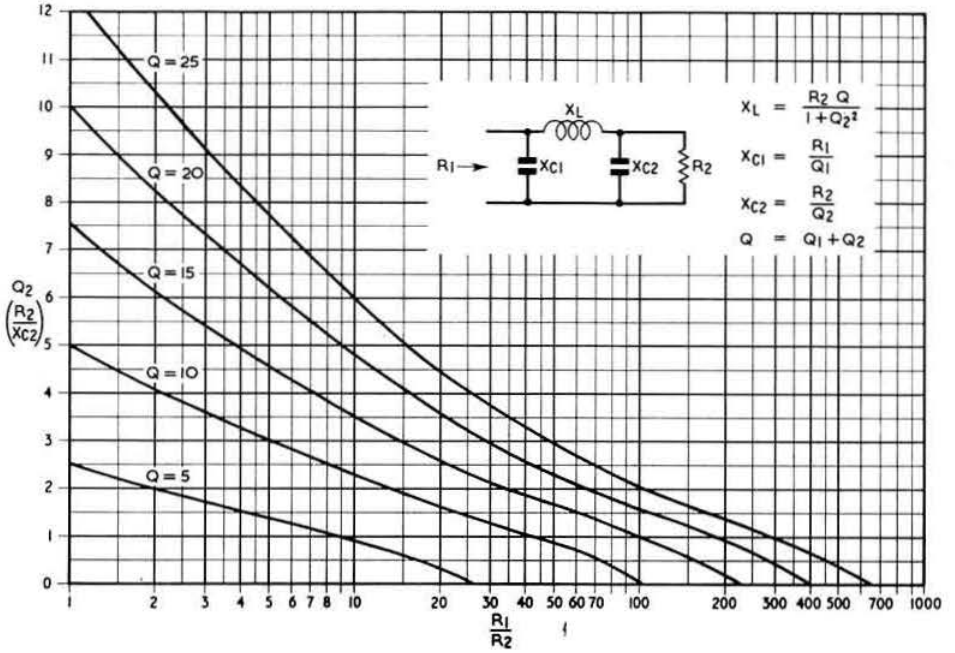


Fig 3.

transformed by the Pi-coupler. Dividing (8) by (7) and rearranging, we have,

$$X_{c1} = \frac{R_1 \cdot R_{s2}}{X_L - X_{s2}}$$

Therefore $$\frac{X_{c1}}{R_1} = \frac{R_{s2}}{X_L - X_{s2}}$$

$$\frac{R_1}{X_{c1}} = \frac{X_L}{R_{s2}} - \frac{X_{s2}}{R_{s2}}$$

But $$\frac{X_{s2}}{R_{s2}} = \frac{R_2}{X_{c2}}$$ (from equation (6)).

therefore $$\frac{X_L}{R_{s2}} = \frac{R_1}{X_{c1}} + \frac{R_2}{X_{c2}}$$

ie $Q = Q_1 + Q_2$. . . . (10)

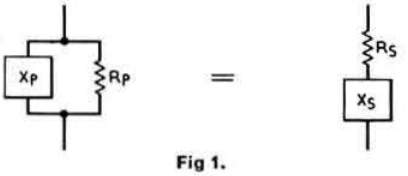


Fig 1.

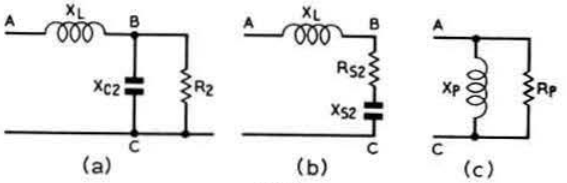


Fig 2.

Dividing equation (7) by R_{s2}

$$\frac{R_1}{R_{s2}} = 1 + \left(\frac{X_L - X_{s2}}{R_{s2}}\right)^2 = 1 + (Q - Q_2)^2$$

But from equation (5)

$$R_{s2} = \frac{R_2}{1 + \left(\frac{R_2}{X_{c2}}\right)^2} = \frac{R_2}{1 + Q_2^2}$$

therefore $$\frac{R_1}{R_2}(1 + Q_2^2) = 1 + (Q - Q_2)^2$$

$$\frac{R_1}{R_2} = \frac{1 + (Q - Q_2)^2}{1 + Q_2^2} = \frac{1 + Q_1^2}{1 + Q_2^2} \quad \ldots (11)$$

Now from equation (9)

$$\frac{X_L}{R_2} = \frac{Q \cdot R_{s2}}{R_2}$$

and since from equation (5)

$$R_{s2} = \frac{R_2}{1 + Q_2^2}$$

therefore $$\frac{X_L}{R_2} = \frac{Q}{1 + Q_2^2} \quad \ldots (12)$$

We can now prepare design curves for Pi-couplers for any chosen value of Q, by selecting combinations of Q and Q_2 and calculating $\frac{R_1}{R_2}$ from $\frac{1 + Q_1^2}{1 + Q_2^2}$. Thus for $Q = 15$

Q_1	15	14	13	10	7·5	5	2	1	0
Q_2	0	1	2	5	7·5	10	13	14	15
$\frac{R_1}{R_2}$	226	98·5	34	3·88	1	0·257	0·0294	0·0102	0·0044

If Q_2 $\left(\text{i.e. } \frac{R_2}{X_{c_2}}\right)$ is plotted against $\frac{R_1}{R_2}$, the appropriate value can be read on the chart for any transformation ratio. It is unnecessary to plot values of $\frac{R_1}{R_2}$ less than 1, since the coupler is reversible.

The chart, Fig. 3, gives the curves for $Q = 5, 10, 15, 20$ and 25. Having found Q_2 from the curves then $X_{c_2} = \frac{R_2}{Q_2}$

$$X_{c_1} = \frac{R_1}{Q - Q_2}$$

$$X_L = \frac{R_2 \cdot Q}{1 + Q_2^2}$$

It should be noted that the ratio $\frac{R_1}{R_2}$ which corresponds to $Q_2 = 0$, is a theoretical maximum ratio for the value of Q assumed. In fact X_{c_2} is infinity at this ratio (that is, C_2 has disappeared) and the practical limit is a somewhat smaller ratio.

Worked example

An amplifier requiring an anode load of 500 ohms is required to match a 50 ohms aerial feeder.

$$\frac{R_1}{R_2} = \frac{500}{50} = 10$$

Let us select a loaded Q of 15—
from Fig. 3, $Q_2 = 3{\cdot}5$, hence $Q_1 = 15 - 3{\cdot}5 = 11{\cdot}5$

from equation 12, $\frac{X_L}{R_2} = \frac{15}{1 + 3{\cdot}5^2} = 1{\cdot}132$

Hence $X_{c_2} = \frac{50}{3{\cdot}5} = 14{\cdot}3$ ohms

$$X_{c_1} = \frac{500}{11{\cdot}5} = 43{\cdot}5 \text{ ohms}$$

$$X_L = 1{\cdot}132 \times 50 = 56{\cdot}6 \text{ ohms}$$

so that for any given frequency, the values of C_1, C_2 and L, can now be calculated.

Design for the L-Pi-network

The L-Pi network can readily be designed by this method if it is regarded as two Pi networks, back to back, in which the input capacitance is provided wholly by the output capacitance of the transistor.

The circuit then becomes **Fig. 4**

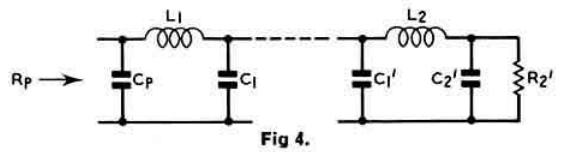


Fig 4.

The following example uses the values shown in a detailed calculation on pages 726-7 of *Radio Communication* for November 1968.

The requirements were to match a 2N3632 transistor of output capacitance = 22pF and requiring a load of 29 ohms, into a final load of 72 ohms. Q values of 10 for the first network and 15 for the second network were assumed and the design was for use at 144 MHz where the reactance of 22pF was shown to be 50 ohms.

Now $\frac{R_p}{X_p} = \frac{29}{50} = 0{\cdot}58$, let us call this Q_2

as the transformation in the first section is from low to high impedance. From Fig. 3, $\frac{R_1}{R_2}$ can be seen to be 66 for $Q_2 = 0{\cdot}58$ and $Q = 10$. Hence the effective load across the output of the first section is $66 \times 29 = 1920$ ohms (1970). Since

$$Q_1 = 10 - 0{\cdot}58 = 9{\cdot}42$$

$$X_{c_1} = \frac{1920}{9{\cdot}42} = 204 \text{ ohms (208)}$$

$$\text{also } \frac{X_{L_1}}{R_2} = \frac{10}{1 + 0{\cdot}58^2} = 7{\cdot}49$$

$$X_{L_1} = 29 \times 7{\cdot}49 = 218 \text{ ohms (220)}$$

The second network, must now match 1920 ohms to the 72 ohms (aerial feeder),

hence $\frac{R_1^1}{R_2^1} = 26{\cdot}6$ and for $Q = 15$

Fig. 3 shows $Q_2 = 2{\cdot}3$

hence $X_{c_2^1} = \frac{72}{2{\cdot}3} = 31{\cdot}3$ ohms (29·7)

now $Q_1 = 15 - 2{\cdot}3 = 12{\cdot}7$

hence $X_{c_1^1} = \frac{1920}{12{\cdot}7} = 151$ ohms (156)

from equation 12, $\frac{X_{L_2}}{R_2^1} = \frac{15}{1 + 2{\cdot}3^2} = 2{\cdot}38$

$$X_{L_2} = 2{\cdot}38 \times 72 = 172 \text{ ohms (186)}$$

The values in brackets are those given in the earlier article.

Comparing the results with original design, given in brackets, there is agreement within $2\frac{1}{2}$ per cent in the first section and a difference of some $7\frac{1}{2}$ per cent in the second section which results from the inaccuracies of the earlier pi-network formulae.

Direction Finding and D/F Receivers

It is regretted that an error appeared in the circuit diagram of the above article published on page 241 of the April edition. In the transistor oscillator section, R5 should read 27 K ohm and not 2·7 K ohm as published.

DX-pedition to GC

By Maurice Margolis, G3NMR*

The island of Guernsey, with 50,000 inhabitants, has 26,000 cars, all of which seem to be on the roads at the same time. Its other claim to fame, from the radio point of view, can be said to be the QTH of Les Ward, an enthusiastic member of this Society, proprietor of the Forest Hotel.

The hotel is situated 150 yards from the airport, so the first thing you see on landing is a G3BXI tower, surmounted by a Hy-Gain quad, and, just a few yards away, a TA33 fitted to a hotel chimney with a length of scaffold pole.

Laurie, G3UML, and I were invited by Les to operate from there for the CQ World Wide SSB Contest on 12-13 April. We readily accepted the kind invitation, envisaging a marathon operation and astronomical score from the much sought-after island.

Laurie, with younger brother, Jonny, formed the advance guard and descended on Guernsey three days before the contest, complete with Drake TR4, RV4 and accessories, to make sure everything was in a Go condition. From the start it was evident that we would have to battle with more than just a contest. We had not reckoned for the violence of the equinoctial gales that were lashing the island, bending everything in sight, with the exception of the G3BXI tower, and destroying aerials as fast as they were put up. However, Laurie and Jonny seemed to be winning the battle, fortified by the excellence of Les Ward's cooking. Skeds with home on 40 and 80 were most encouraging signal strength-wise.

On Friday, 11 April, I phoned Southend Airport to enquire if my flight was to be delayed. All is normal, I was assured. At 1005 a sked with GC3UML assured me that we might leave Southend on time, but, as Guernsey was shrouded in fog and the visibility was 10 yards, the plane could not land. This prophesy turned out to be right. Not only was the flight delayed at Southend, but it went to Jersey instead and we never got off that island that night. An arrangement with a small local aircraft got me to Guernsey at 8 a.m. on Saturday morning, 8 hours after the start of the contest.

Considering that I had a large part of the station with me, in particular the KW-1000 linear amplifier, this was decidedly inconvenient. I made my way to the hotel, to find everybody in bed and fast asleep, the quad flapping helplessly in the wind, its rotator broken, the 20 and 10 metre sections bearing dumb witness to the severity of the gales, the 80 metre inverted V not working and the 40 metre aerial on its last legs.

Before unpacking and waking anybody, I set to and installed all the station properly. By the time this was done, Les and Jonny were up and about, but understandably disconsolate. After injecting some genuine British backs-to-the-wall enthusiasm into them, Les produced a whacking great bacon-and-egg breakfast and Jonny and I set about repairing the aerials. By the time I had the quad down, repaired and up again, with ropes fitted to pull it, in place of the rotor, Laurie appeared. It was obvious, he said, that we had lost too much time to give effective competition to other multi-op stations, but, as a single-operator entry had to take an 18-hour rest period in up to five separate periods, with now about half the rest time passed, it was possible to put up a good single-operator show, if the aerials held out.

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G3UML looks heavenwards for encouragement during a quiet spell.

Les Ward, BRS27952, was mine host at the fabulously equipped bar of the Forest Hotel. Les built much of the bar himself.

Now, at heart I'm not a real contest man and the prospect of not getting laryngitis appealed to me. I also wanted the chance to meet the Guernsey amateurs in their own Club building and to see a little of the island, if the wind would only stop and give me a break from the continuous aerial repairs.

The wind dropped somewhat on Sunday and the sun came out, transforming the island's forbidding, barren loneliness to a brilliant green, inviting landscape, with gentle blue seas lapping against benevolent shores, all under the watchful gaze of contented Guernsey cows.

The visit to the Radio Club was most pleasant. It was a fine shack, a lecture room, construction room and well equipped test bay, exhibiting many expressions of benevolence from Tektronix, who have a factory on the island.

I think GC3UML made his presence felt in the contest, working 94 countries and 245 prefixes in 1,150 contacts, and we look forward to the contest results. In the meantime the first trickle of QSL's has gradually turned into a flood, which, I must admit, is good for the ego and makes us hope that Les Ward will invite us to operate another contest from his fine hotel sometime. We offer him our most sincere thanks for the opportunity and hospitality he gave us. We shall be rooting for him when he hears the RAE result in July.

REGULAR FEATURE

TECHNICAL TOPICS

By PAT HAWKER, G3VA

RECENTLY, a letter from Jim MacIntosh, GM3IAA, included a memorable phrase in suggesting that it is up to the amateur to try " to beat the textbook."

This does not mean that the amateur can fly recklessly in the face of basic radio theory and practice; rather it is a reminder that almost any book, even a standard text, is only a collection of consensus theory built up over the years, always subject to change, or modification, or reappraisal in the light of later developments. To someone who spent many years attempting (though rarely succeeding) to bring out technical books which were not hopelessly outdated, even before they appeared, the problem of constantly changing theory and practice has always loomed large. Apart from circuit and component developments, there is the question of the " accepted " theory which, originally put forward to account for the then known facts, gradually becomes firmly established almost as "holy writ," when in reality it has never been more than a " best fit " hypothesis, and so is liable to be superseded.

Chordal Hop Propagation

There is, in particular, one radio field in which the amateur has traditionally played a major part in tilting at established beliefs, and in providing the practical results on which the next set of theories can be built. This is radio propagation, which, despite all the esoteric expertise, has still many unsolved mysteries left.

For example, just about every radio textbook—amateur or professional—tells us that long-distance hf contacts are made by multi-hop reflections between the ionosphere and the earth, and that the maximum range of single-hop transmission is about 5,000 km. Indeed this is still the basis of almost all propagation predictions.

Yet—and once again it is the amateurs who provided much of the initial information which is upsetting the established explanations—it is increasingly clear that many of the longer distance contacts (and not just a few in " freak " conditions) on hf and vhf, and we suspect on mf, do *not* involve any intermediate ground-reflection points, to introduce attenuation. In the early 'fifties (as Les Moxon, G6XN recently brought to our notice) Hans Albrecht, while operating as a VK2 and with the help of a group of other VKs, proved (at least to his own satisfaction), that the low path losses and unpredicted times of openings on many 3·5, 7 and 14 MHz amateur signals arriving in VK from Western Europe could be explained only by rays " propagated in geometrically inscribed hops along the layer . . . but with not necessarily all the ground reflection points required by multihop theory " (1957 publication).

Albrecht, following his return to Europe, further developed his ideas and named this mode of propagation " chordal hop." In parallel to, but separate from, this work was the slow appreciation, outside amateur circles, of the implications of what became known as " transequatorial " (TE) propagation. TE propagation, as many readers will be aware, was first observed on amateur contacts on 50 MHz (Central to South America, and Mediterranean to southern Africa) about 1947, but it took some years to interest the professional propagation experts in this work. Here again, TE spans long distances without intermediate ground reflection, and is thus a form of chordal hop mode. These modes are now generally explained as arising from tilts in the ionosphere (although this may not be the only explanation) Over the past decade, many informative articles have appeared—particularly those by Villard, Stein, Fenwick, Muldrew, Maliphant, etc. in the *Journal of Geophysical Research:* again I must acknowledge my debt to G6XN for bringing many of these papers to my notice. This work resulted in the CCIR Report 250-1 of 1966 whereby communications engineers formally admitted the existence of long-distance ionospheric propagation modes without intermediate ground reflection.

Then, more recently, and partly arising out of the long series of tests in which Paul Sollom, G3BGL has been assisting workers at the Radio and Space Research Station, it is now being suggested that, even around 200 MHz, many of the stronger vhf over-the-horizon signals are due to some form of chordal hop mode (M. P. Hall, *Proc. IEE*, April and November, 1968), in connection with layers and clouds of ionised particles in the troposphere.

Unfortunately, we cannot spare the space to go further into this subject this month, though it is worth stressing the considerable practical importance to hf and vhf amateurs and to broadcasting and communications of all this current " re-writing " of established propagation theories. We referred to some practical implications in a previous *TT* item (November, 1967 or *ART* pages 137–8) as well as to such intriguing matters as tilts, whispering galleries, layer entrapment, round-the-world waveguidance propagation. These all offer considerable possibilities for DX contacts " above the classical muf " with some of the modes possibly exploited by extreme low-angle radiation (or more precisely by low-angle arrival of the signals at the ionised layer).

Perhaps the main point we are trying to make here is that

this is an area where, as the result of the combined efforts of amateurs and professionals, much of what is stated so confidently in almost all the radio textbooks can now be regarded as only half the truth.

Yes—the amateur can still " beat the textbook " and help to write the next edition. Amateurs should never allow themselves to be stultified by conventional theories—or to refrain from following up unexpected results simply because they appear to conflict with the standard texts.

Self-oscillating FET Mixer

Although not often used in high performance receivers, one of the most popular of all bipolar circuits in so far as transistor radios are concerned is the economical self-oscillating additive mixer, in which a single device acts both as mixer and as local oscillator.

An article in *Electronics* by D. R. von Recklinghausen (December 23, 1968) suggests that it is now possible to produce a comparable low-cost mixer using an FET, and claims that this can perform as well as separately excited FET mixers—at least for consumer electronics. It is pointed out, that until recently, self-oscillating FET mixers have presented problems arising from the limiting action of the FET's forward biased gate current producing a clipped, square-wave signal. The solution (akin to the recent hint on super-regen detectors) is to incorporate a diode agc to keep the local oscillator voltage level constant, so avoiding the earlier need to control very closely the level of the oscillation signal.

It is noted that the dynamic resistance of a diode placed across an oscillator tuned circuit decreases steadily with increasing oscillation voltage. A single germanium diode limits oscillator voltage to about 0·5 volt peak-to-peak; a single silicon diode to about 1·4 volts; other limiting voltages can be achieved using a series of diodes.

Fig. 1 reproduces a suggested medium-wave mixer using the popular 2N3819 FET, with a 1N294 limiting diode across the source feedback winding. The purpose of the neutralising capacitor is to eliminate any oscillator voltage which might otherwise appear at the gate electrode. The simplicity of the circuit (apart from questions of improved performance) compared with a conventional bipolar mixer can be seen in the direct connection of the high-impedance signal-frequency tuned circuit to the gate without requiring the impedance transformation of bipolar mixers, and the absence of the bipolar base-biasing network. It is claimed that the circuit provides more overload capability and a lower noise figure than most transistor am receiver front-ends using separately excited mixers.

It would be interesting to find out how good is the performance at hf or vhf in the more demanding communications receivers, but in any case it looks like a useful circuit to know.

Solid-state Screen Clamp

The increasing availability of transistors having relatively high collector-to-emitter breakdown-voltage ratings (BV_{ceo}) is gradually opening the way to new applications for solid-state switching systems. In *Ham Radio* (September, 1968), Chris Grant, W0LRW, described a screen clamp system intended for use in conjunction with a 300 volt supply and providing a regulated 200-volt screen supply when rf drive is applied to the pa, dropping virtually to zero in the absence of drive. W0LRW indicates various advantages of such a

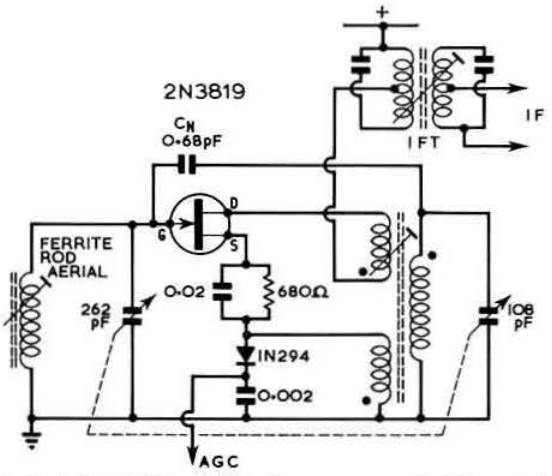


Fig 1. Self-oscillating FET mixer as suggested for use in a medium-wave broadcast receiver.

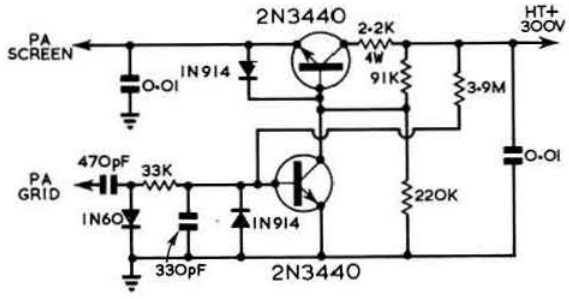


Fig 2. The W0LRW solid-state clamp circuit using high-voltage af transistors.

system compared with the more conventional valve clamp arrangement, in permitting virtually direct switching of the screen to earth potential, and the elimination of power-loss and heat arising from the power normally dissipated in a clamp valve and voltage dropping resistor. The fact that the screen potential is almost independent of screen current is a further benefit.

Fig. 2 shows the arrangement described by W0LRW: the presence of rf drive puts a negative voltage on the lower 2N3440 transistor, cutting it off; the other 2N3440 is connected as an emitter follower which puts on to the screen of the pa a potential almost exactly equivalent to the value existing at the junction of the low-wattage 91K and 220K voltage divider. With no rf drive, the lower 2N3340 is switched on, connecting the screen virtually to earth.

While the transistors can be af types, it is of course essential that they should be of the recent high breakdown voltage type (we have no details on availability and price of these in the UK although it seems almost certain that they can be obtained). He states that the silicon 2N3440s have a rated BV_{ceo} of 250 volts, whereas strictly speaking the rating should equal or exceed that of the supply voltage (in this case 300 volts); however, he claims that all those tested showed a true figure of at least 500 volts and could be used reasonably safely.

The two 1N914 diodes protect the transistors from reverse breakdown at the emitter-base junction.

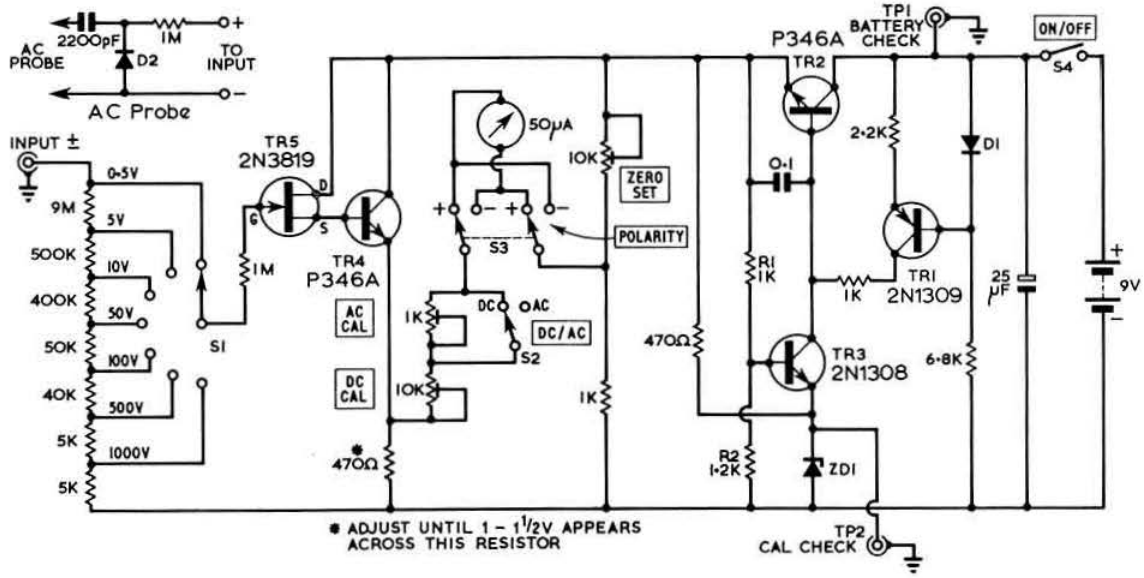


Fig 3. The GM3SAN FET-voltmeter with emphasis on stability.

This is only a brief summary of a three-page article, but should provide sufficient information to try this type of arrangement if the devices can be obtained at an economical figure. One important application of such clamp arrangements is to minimize noise generation from a transmitter used in conjunction with a T-R switch. It is claimed that only a few tenths of a volt appear on the pa screen during key-up conditions.

Stable FET Voltmeter

S. Weir, GM3SAN was interested to compare the FET voltmeter approach of the G3GED unit (*TT*, March) with that of a unit which he developed soon after the basic FET/n-p-n circuit appeared in *TT*, March, 1968.

GM3SAN does not agree that sensitivity should normally be regarded as more important than stability, and this outlook has led to a six-range (0·5 to 1000 V) meter with emphasis on stability: Fig. 3. He more than confirms the extremely good linearity and reasonable temperature stability of the basic circuit, but found that the zero-setting is inevitably sensitive to changes in supply voltage. He therefore went ahead with a self-contained unit operating from a stabilised 4·5-volt line derived from a 9-volt battery which can be used down to about 6·5-volt end of life. He says that his stabiliser means that a 25 per cent change in battery voltage causes the zero set to change by less than 1 per cent with a total battery drain of only about 10 mA.

GM3SAN has also incorporated polarity switching; a slight initial calibration difference was eliminated by changing the emitter resistor of the bipolar device from 10K to 470 ohms (this may require adjustment to meet variations in FET characteristics). He also includes a 1K preset trimpot control and single-pole switch to allow the unit to be calibrated to read rms values when used in conjunction with the rf probe. His final circuit is shown in Fig. 3.

The input attenuator resistors are 1 per cent high stability types. The P346A bipolar is similar to a 2N708. Small trimpots are used for calibration. A ten-turn helipot is used in the zero-set position and provides very smooth control and GM3SAN suggests that if an ordinary control is used the value should be reduced to 1K and its range limited by suitable series resistors. The constant current stabilising arrangement is the outcome of trying a number of standard circuits which proved unsatisfactory with a widely varying input voltage. The 2N1308 and 2N1309 complementary pair can be obtained at around five shillings each. Some slight adjustment may be needed for " ultimate " performance depending on transistor gain; if the output voltage is not in the range 4 to 4½ volts, R1 or R2 should be varied. For a 25 per cent change in input the output should not vary by more than 10 mV. Test point TP1 allows battery voltage to be checked, while TP2 provides a voltage for checking long-term calibration. A suitable zener is the STC type Z2A30CF which is available from Henry's Radio.

GM3SAN has used this meter for more than 12 months and finds it a most useful and stable instrument; no change in calibration has been detected since the initial calibration.

" Double-Delta " Aerials for VHF and UHF

The recent *QST* articles on delta-loop aerials (see *TT*, May 1969) have prompted John Pegler, G3ENI, chairman of the Royal Naval Amateur Radio Society, to pass along information on two and three element " double delta " aerials he has been using for some years on 70 and 144 MHz as well as an eight element version used for television reception on uhf Channel 24.

The radiator consists of two dural tubing triangles mounted vertically so that their apexes can be joined and earthed to the boom, in a " plumber's delight " configuration. These deltas are fed in phase by means of a double balanced gamma matching system: Fig. 4. Reflectors and directors have a similar configuration, and are mounted on the boom with a reflector spacing of 0·2 λ and a director spacing of 0·15 λ. This unequal spacing, G3ENI suggests, appears to provide

optimum gain, and also has the advantage of keeping the radiator clear of the support mast. Overall lengths of each Delta can be calculated as follows:

Reflector 1078/(MHz) feet or 12936/(MHz) inches
Radiator 1007/(MHz) feet or 12084/(MHz) inches
Director 948/(MHz) feet or 11376/(MHz) inches.

These dimensions are very slightly longer than would be obtained using conventional formulae: actual dimensions for 70·250 MHz and 145 MHz are shown in Table 1. G3ENI says that if maximum front/back ratio is required the reflector length may be varied slightly as a result of listening tests. The radiator lengths are empirical ones arrived at by measuring with the aid of a gdo.

TABLE I

Element	70.25 MHz	145 MHz
Reflector	184 in.	89¼ in.
Radiator	172 in.	83¼ in.
Director	162 in.	78¼ in.

The radiating action of this aerial can be visualised as two one-third-λ horizontal radiators spaced broadside at just over $\frac{1}{2}$-λ, with associated reflectors and directors: a horizontal component is also radiated from the central apexes.

G3ENI has obtained approximate figures for gains referred to a half-wave dipole, by means of listening tests in conjunction with a low-loss rf attenuator with constant S-meter reading. He lists these as: radiator alone 3–4dB; radiator plus reflector 8–9dB; reflector/radiator/director 10–11dB.

He considers that the additional gain which would be obtained using a second director in a four-element beam as hardly worth the added mechanical complexity. However, he puts the gain from an eight-element uhf aerial for Channel 24 (500 MHz) as about 15dB (reference dipole).

The 70 and 144 MHz arrays were made using $\frac{3}{8}$-inch dural tubing; the 500 MHz array from 12 swg tinned copper wire using a wooden boom.

HF " Skeleton Slot "

There have been many innovations which although originally adopted or intended for more than one region of the radio spectrum have subsequently tended to become associated with only one part of the spectrum. For example the cascode rf amplifier, originally described for hf, was for about a decade used almost exclusively at vhf. The Armstrong " super-regen " was initially intended for medium-wave broadcast reception!

Bill Capstick, G3JYP, points out that, when B. Sykes, G2HCG, first described the Skeleton Slot (*SWM*, January, 1955), his article underlined its possibilities for hf as well as vhf applications. Yet, although this aerial subsequently proved extremely popular on vhf, little attention has been given to it by hf operators despite the good results obtained by G2HCG with a multi-element 28MHz skeleton-slot beam.

G3JYP has been rectifying this omission by building a 21 MHz skeleton slot (9 ft by 27 ft) and finding to his delight that it also works well on 14 and 28 MHz, and has had some success even on 70 and 7 MHz, even though, with these slot dimensions, it is down on a 7 MHz dipole. He believes that a smaller version (7 ft by 21 ft) would be suitable for those not requiring a major 14 MHz capability. The close similarity to the " Lazy Quad " given in the November, 1968, *TT* is very evident from Fig. 5.

G3JYF's skeleton slot is made from 1¼-in dural tubing

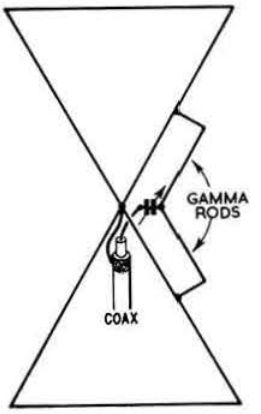


Fig 4. G3ENI " double delta " aerials for vhf—basic driven element.

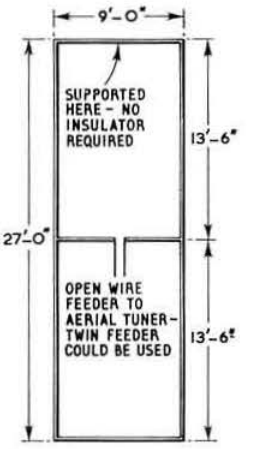


Fig 5. G3JYP's hf " skeleton slot " aerial.

(though only because G6VQ had denuded the local supplier of 1-in tubing). It is fed with open wire feeder via a Z-match in the shack, and the bottom of the slot is about 30 ft off ground, on a metal pole (no noticeable difference in performance noted with a similar aerial mounted on a wooden pole—presumably a result of the horizontal polarization).

Clearly, this form of array calls for relatively high supports, but G3JYP points out that, apart from the useful performance, its appearance is " reasonably tidy " against a backcloth of tall trees.

Aesthetics of Aerial Systems

On this general question of the appearance and aesthetics of aerial systems, a pioneering and thought-provoking article on this subject appears in *Point-to-Point-Telecommunications* (April, 1969) by M. F. Radford of *The Marconi Company*. He outlines some of the ways in which engineering, functional design and cost-effectiveness are combining to make possible aerial systems for hf, microwave relays, satellite communications and even just TV reception, having a more attractive appearance.

He lists new constructional techniques including glass fibre laminates, plastics, honeycomb sandwiches, precision castings and complex extrusions which have now overcome their initial teething troubles. Then again he mentions aerials disguised as flagpoles on embassies (there is no disguising the enormous hf log periodic erected recently on the Hungarian Embassy in London—though aesthetically this form of array is not without some appeal), as roof racks on cars, or hidden in structures as notches or slots, or mounted flush with surfaces as printed circuit arrays—" the possibilities are endless, but the art lies in knowing when to stop."

Of the tangle of TV aerials on roof tops, he points out that despite the initial lower performance of loft space aerials, characteristics remain constant over years, whereas those of outside aerials may be reduced gradually by wind, weather, flue gas, corrosion and by penetration of moisture into cables and terminations. He believes that many rooftop

aerials are made inefficient by overcrowding and could often be replaced by carefully sited aerials in the loft space.

The amateur often finds it difficult to appreciate that his "beautiful" aerial may be giving visual pain to others, whereas—as Radford points out—an aesthetically satisfactory design may actually give added interest to an otherwise plain landscape. Good functional engineering design in the past has given us the wartime "Spitfire," the racing yacht and the great bridges—there is no reason why aerials should always be eyesores. An "offbeat" subject perhaps, but one which we should do well to consider, if only to counter local authority objections to amateur aerials.

Incidentally, some idea of the relative resistance to corrosion of common metals is useful to know for outside installations. The following list (starting with the most corrosion resistant) is based on one prepared for one of the newsletters by W. G. Welsh, W6DDB: platinum; gold; silver; chromium, nickel; lead-tin solders; bronze; copper; brass; tin; lead; steel/iron; aluminium; cadmium; zinc; magnesium.

Variable Selectivity AF Filters

The high-performance, variable-selectivity af filter design sent along by Ron Skelton, 6Y5SR (*TT*, March) has rightly been attracting considerable attention, not only from hf operators but also from vhf types on the look-out for "ultimate" sensitivity for applications such as moon-bounce, while retaining the ability to broaden out response to fit any circumstances. Unfortunately—and the omission is regretted—it was not made clear in March that this form of filter was developed by R. E. Schemel, who after various attempts to interest receiver manufacturers in this type of filter, wrote a most informative article, including general design principles, which was published in *Wireless World*, August, 1967. Those interested in high-Q af filters will find it well worth while looking up the original article.

He made it clear that three amateurs who had tested his original filter had all reported that, in its widest position, the filter was beneficial for the reception of 'phone. The measured characteristics of this filter differed slightly from those of 6Y5SR's unit, with 6 Hz (−6dB) bandwidth in its narrowest position and 600 Hz (—6dB) in widest position. It was pointed out that additional sections of Q-multiplied resonant filters could be added to obtain a better shape factor; another useful hint was that more constant group delay characteristics can be obtained by slight stagger tuning of the resonant circuits, the Vinkor inductors being tuned to frequencies spaced by about 5 or 7 Hz. This can be achieved most easily by allowing each stage to oscillate gently. The minimum bandwidth is governed largely by the value of the ganged potentiometer: 25K was used in the original compared with the 100K in the March *TT*.

TABLE II

	Core	Q	N	SWG
LA2131	35 mm violet range	390	98	22
LA2331	25 mm violet range	210	122	26
LA2433	21 mm violet range	100	166	29
LA2002	45 mm yellow range	300	138	21
LA2103	35 mm yellow range	200	155	24
LA2303	25 mm yellow range	100	192	28

Quoted codes include complete mounting assembly (*Wireless World*, August 1967).

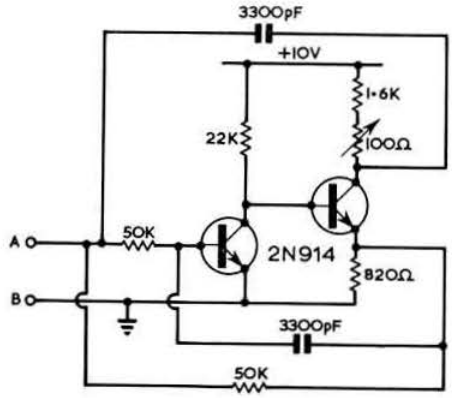


Fig 6. 1000 Hz tuned circuit simulator.

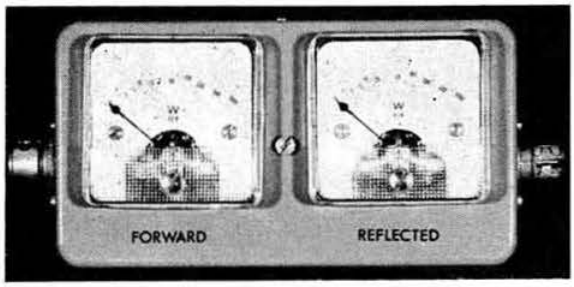
Included in R. Schemel's article was some useful winding data for Vinkor cores suitable for this filter, derived from the Mullard Vinkor handbook: this is shown in Table II.

Other interesting af filter arrangements using SICs and one using a twin T network with separately variable gain and selectivity have been noted by GW3PJT and G3JGO and we hope to refer to these shortly. Meanwhile a description of a simple "high-Q tuned circuit simulator" has been described in the correspondence columns of *Electronic Engineering* (February, 1969) by Lucio Varrazzani of Pisa University: Fig. 6. This is a practical realisation of a 1000 Hz simulated tuned circuit using wide-band dc coupled amplifier which might be suitable for integrated circuits. This simulates an inductance of about 8 henrys. Circuit adjustment is obtained by first regulating the 100-ohm variable resistance so that the circuit oscillates, and then just backing it off until there is no continuous oscillation. This has a measured frequency response of about 10 Hz for 0·7 voltage across the terminals A, B. *Q* factor is nearly 100. Such a tuned circuit simulator could form the basis of a useful audio filter.

Here and There

It is regretted that there is an error in the circuit diagram (*TT*, April) of the improved super-regen detector, since there is clearly a direct short-circuit between collector and emitter dc. Unfortunately this error appears in the original publication, and it has not yet been possible to determine definitely the correct circuit, although I assume that a capacitor has been omitted. An interesting letter from Alfred Schaedlich, DL1XJ (who incidentally praises the popular Philco combined ssb/am detector of *TT*, *TTfiRA* and *ART*) mentions that the technique of adding a diode to a super-regen detector was patented in Germany by DL1UU together with a number of other techniques for improving super-regen. The main novel feature was that the super-regen rf circuit must be artificially damped since otherwise the bandwidth will not suffice to allow transmission of the pulses which are the heart of the super-regen principle. DL1XJ recalls a publication regarding this patent in a German technical journal, and hopes that he may be able to dig it out.

Frequency-Independent Directional Wattmeters, and an SWR Meter



By P. G. MARTIN, BSc, G3PDM*

THE frequency dependence problem associated with conventional reflectometers precludes their use for accurate power measurement. This arises because the transmission line voltage is sampled by a voltage divider consisting of a fixed resistance and the distributed capacitance of a length of transmission line, and because the line current is detected by an rf transformer consisting of a small wire loop inductively coupled to the line. In the first case the capacitive reactance varies with frequency and affects the divider ratio. In the second instance the voltage induced across the loop is proportional to the rate of change of magnetic flux around it, and therefore increases with frequency.

Both these basic failures can be corrected by the use of conventional lumped components instead of the distributed parameters of transmission lines. In particular the voltage detector should consist of two resistors rather than an R and C, and the current detector should be a toroidal current transformer (which is a conventional transformer with a low value of load resistance across its secondary).

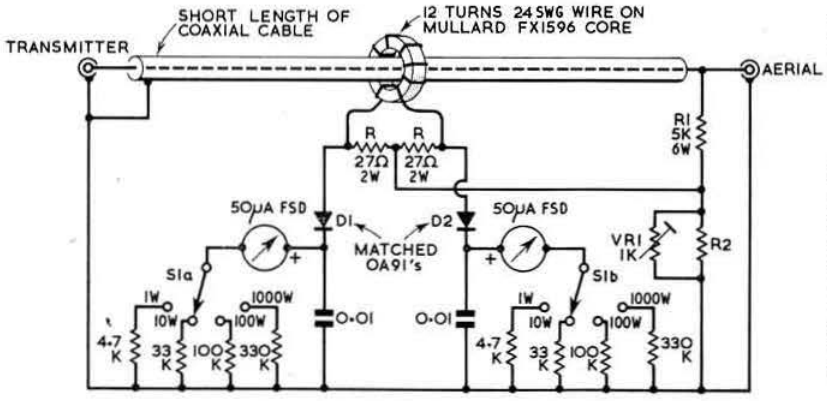
A basic requirement of swr bridges or directional wattmeters is to generate two voltages proportional to the forward and reflected voltages or currents of the transmission line. To achieve this one has either the current detector or the voltage detector providing two anti-phase signals so that addition and subtraction can be performed.

A Frequency-Independent Directional Wattmeter

M. B. Allenson, G3TGD, has designed a wattmeter using the above principles, where the low resistance in the current transformer secondary circuit is split into two equal parts. The centre connection is taken to the voltage sampling network so that sum and difference voltages are available at the ends of the transformer secondary winding. See Fig. 1.

With two meters (or an ex-Government cross-over meter) this circuit can be used as a versatile calibrated directional wattmeter. The unit also enables precise calculations of swr to be made. The prototype was accurate as a power meter from 100 kHz to over 70 MHz, within a

* Oak Cottage, Witton Gilbert, Durham.



The sensitivity ranges given in S1a and S1b are double the correct figure. Those in the caption are correct.

Fig 1. Circuit of the basic frequency-independent directional wattmeter, with four ranges corresponding to fsd's of 0·5, 5, 50 and 500 watts in 50 ohm lines, when the value of R2 (including VR1, if fitted) should be 220 ohms. For 75 ohm systems R2 = 150 ohms, and the calibration is different. The coaxial cable acts as an electrostatic screen between its centre conductor and the secondary winding of the toroidal transformer: the cable length is unimportant.

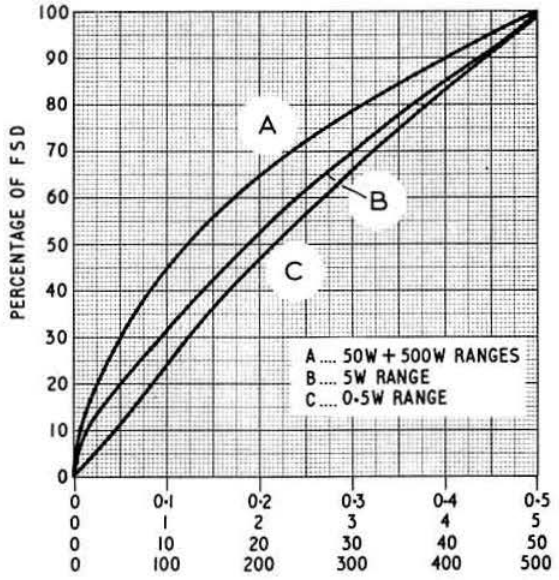


Fig 2. Calibration curves for the directional wattmeter of Fig 1.

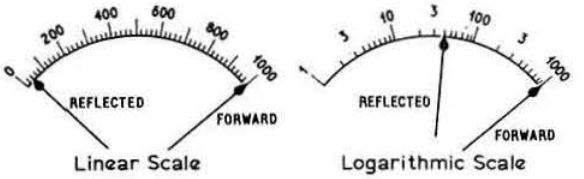


Fig 3. (a) Linear, and (b) logarithmic scales showing the same standing wave situation: a forward power of 1 kW and a reflected power of 40 watts. The advantages of logarithmic scales are immediately obvious.

tolerance of 10 per cent. With a 50 μA meter the maximum sensitivity is better than five milliwatts: with the multiplier resistors specified in Fig. 1, full scale deflection corresponds to powers of 0·5, 5, 50 and 500 watts. Calibration is non-linear, because the meter samples voltage, and power is proportional to voltage squared. Calibration curves for 75 ohm systems are given in Fig. 2.

The Logarithmic Wattmeter

The basic instrument can be improved by including a logarithmic network so that the power range switch is redundant and a single meter scale can be used for powers from say one watt to 1000 watts. (A logarithmic scale would have the 1, 10, 100 and 1000 watt calibration points equally spaced: see Fig. 3). Apart from the convenience of not having to switch ranges, a logarithmic unit with two meters would enable very low swr's to be measured quickly and accurately, as it is possible to measure a very low reflected power and a very high forward power simultaneously with the same percentage accuracy. To achieve this with the previous circuit would necessitate separate switches for forward and reflected sensitivities.

It is simple to add a reasonably accurate *wide-range* logarithmic network to the power meter of Fig. 1. The basis of its operation is that the voltage across a forward-biased p-n junction diode is proportional to the logarithm of the current passing through it. See Fig. 4. The logarithmic properties of a silicon junction diode are good over at least eight decades of current (from 5 nA to 1 A), which implies that a single meter scale might be calibrated over sixteen decades of power: from 1 picowatt to 10 kW! In practice a range of 1 to 1000 watts is more useful, so

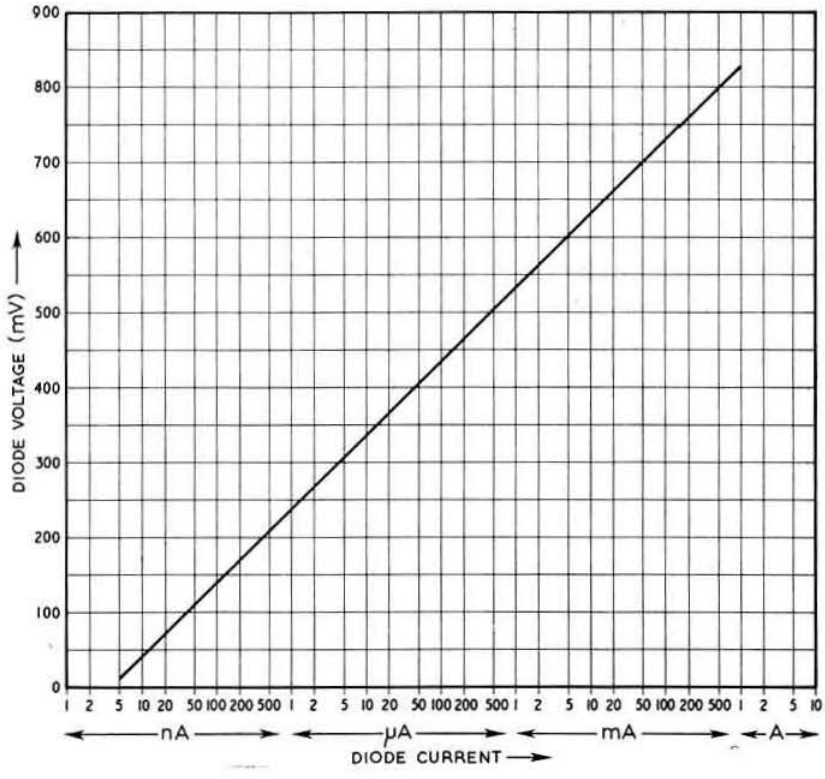


Fig 4. Experimental plot of the forward voltage drop across a silicon p-n junction diode (1N4006), as a function of diode current. The *V/I* relationship is accurately logarithmic for currents between 5 nA and 1 amp.

the logarithmic network must be modified (see Fig. 5). By introducing an insensitive meter the lower decades are condensed, but a resistor in series with the diode is necessary to restore a logarithmic form to the scale.

An experimental logarithmic directional wattmeter is shown in Fig. 6. Fig. 7 shows suitable calibration scales for this instrument, suitable for cutting out and sticking to 1 $\frac{21}{32}$ inch Japanese meters. The circuit combines the sampling networks of Fig. 1 and two logarithmic adapters as in Fig. 5(b).

A Direct Reading SWR Meter†

An extremely useful device, necessitating only one meter, would be an instrument giving direct indication of the standing wave ratio on a transmission line, *independent of the absolute power levels or the frequency in use.* The swr can be expressed in terms of the forward and reflected voltages according to:

$$\text{swr} = \frac{E_f + E_r}{E_f - E_r} \qquad (1)$$

where the symbols have their usual meaning. We wish to generate this function electronically, so that outputs of the two detectors can be used to generate a meter current proportional to swr. This would be rather tedious, though not impossible.

Conveniently, a little manipulation of the offending equation shows that:

$$\frac{E_f}{E_r} = \frac{\text{swr} + 1}{\text{swr} - 1} \qquad (2)$$

which although not proportional to swr, is a function of it only. Electronic division of E_f by E_r is best done by taking logarithms and subtracting. In other words,

$$\log \frac{E_f}{E_r} = \log E_f - \log E_r$$

In Fig. 5(a) the two silicon diode voltages are proportional to the logarithms of their currents, which in turn are proportional to the forward and reflected voltages. The two diode voltages can be subtracted directly by connecting a meter between them, rather than from each one to chassis (see Fig. 8).

Remember of course that the meter cannot be calibrated linearly in swr, because of equation (2). The circuit doesn't take antilogs after subtracting the logs either.

The result of this is beneficial: the swr meter is increasingly sensitive as the standing wave ratio approaches 1:1. This is where one wants most sensitivity: to make the final adjustments to aerial arrays, to measure variations in swr over a band, and so on. Note that the meter reading increases as the swr improves: zero deflection corresponds to infinite swr (or no power!). The accuracy worsens if the reflected power falls below about a tenth of a watt, because of the reflected voltage detector output becoming comparable with the voltage drop across the logarithmic diode, so that the latter is no longer driven by a constant current source. This is avoidable at the expense of some frequency sensitivity by changing circuit parameters in the voltage and current sampling networks to increase their output.

† The instrument described is the subject of a provisional patent specification.

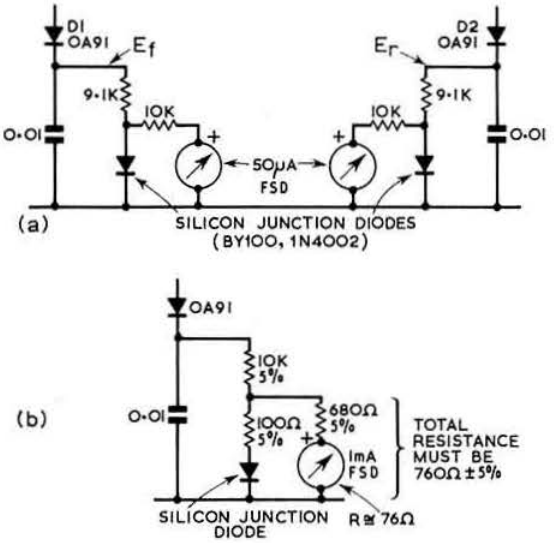


Fig 5. (a) Basic logarithmic converter. The 50 μA meter and its 10 kilohm multiplier resistor form a high impedance voltmeter. With the values given, the meter sensitivity is approximately logarithmic for power levels from 10 mW to 1 kW. (b) Circuit used to reduce the dynamic range of the logarithmic network. A calibration scale is given in Fig. 7.

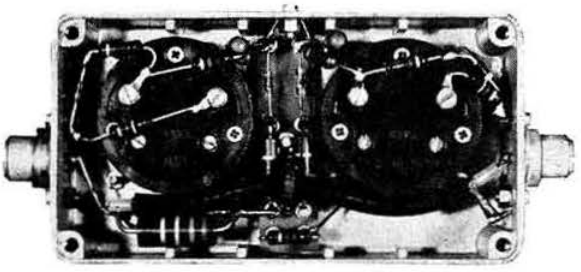


Fig 6. An experimental logarithmic wattmeter. Two 1 $\frac{21}{32}$ in Japanese 1 mA meters and their associated components will just fit into one of the smallest diecast boxes (2 $\frac{3}{4}$ × 4 $\frac{3}{4}$ × 1 $\frac{1}{4}$ in). The toroidal transformer, 27 ohm resistors and OA91 detector diodes are mounted centrally on a small sheet of paxolin studded with " turret tags " (Radiospares).

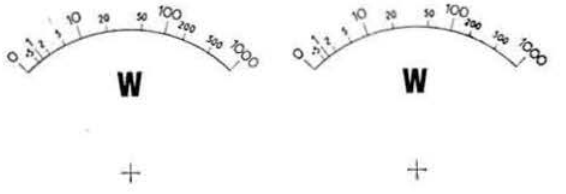


Fig 7. Two scales for 50 ohm systems suitable for cutting out and using on the unit shown in Fig 6.

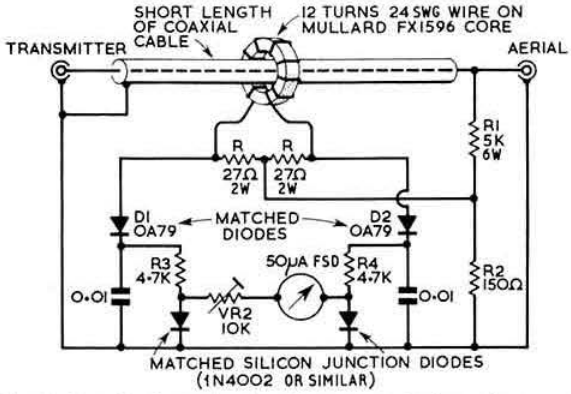


Fig 8. Circuit of a direct-reading power-independent swr meter for 75 ohm systems. At very low reflected power levels (swr better than about 1·005:1) the meter reading is slightly power sensitive. For this reason VR2 is adjusted for fsd under matched conditions at the highest power level to be used. Fig 10. includes a scale suitable for use with powers up to 500W, when VR2 and the meter resistance total about 7·5 kilohms. The logarithmic diodes (1N4002 or almost any silicon junction diode) must be matched, using the circuit of Fig 11. VR1 may be connected across R2 as in Fig. 1.

A differential amplifier could be added to the circuit of Fig. 8, enabling a less sensitive meter to be used. Silicon n-p-n transistors capable of working at low collector currents should be used (e.g. 2N3707).

A Practical SWR Meter

A direct-reading swr meter was built for experimental purposes around the circuit of Fig. 8. Calibration given in Fig. 10 is suitable for 75 ohm systems.

Layout of the sampling circuits is fairly critical (see Fig. 9). The input and output sockets should be set a few inches apart, and connected together with a short length of co-axial cable. The co-ax outer must be earthed at one end only so that it acts as an electrostatic screen between the primary and secondary windings of the toroidal transformer. The primary is formed by simply threading a ferrite ring on to the co-ax. Twelve turns of 24 swg enamelled wire, equally spaced around the entire circumference of the ring, form the secondary winding.

A suitable ferrite ring is the Mullard FX1596, although other types can be used. The main requirement is that the ferrite material should maintain a high permeability over the frequency range to be used.

Other components in the sampling circuits should have the shortest possible leads. R1 and R2 must be non-inductive carbon types: for high power levels (above 100 watts) R1 can consist of two or three 2 watt carbon resistors in parallel. VR1 must be a miniature skeleton potentiometer, to keep stray reactance to a minimum, although it can be dispensed with by trying various fixed resistors for R2 until the reflected indication under matched conditions is zero.

The detector diodes (D1 and D2) need to be matched point-contact types (for low capacitance and good hf performance) with a piv rating of 50 volts or so. Mullard OA79 or OA91 diodes are suitable. The current transformer resistors should be matched to five per cent.

Logarithmic diodes should be silicon junction types, such as conventional rectifier diodes, but they need to be matched for similar log characteristics, using the circuit of Fig. 11. Piv ratings are unimportant.

In designing a toroidal transformer different to that specified, several factors must be traded against each other. As the number of secondary turns increases, the inter-turn capacitance increases and causes the response to fall at high frequencies. Failure of this nature causes the reflected voltage indication to rise: in other words the directivity of the instrument falls. If the 27 ohm resistors are raised appreciably in value, the instruments will eventually become frequency sensitive.

The ratio of the voltage sampling resistors (R1 and R2) is determined by the sensitivity of the current sensing circuit, as the two sampling voltages must be equal in magnitude

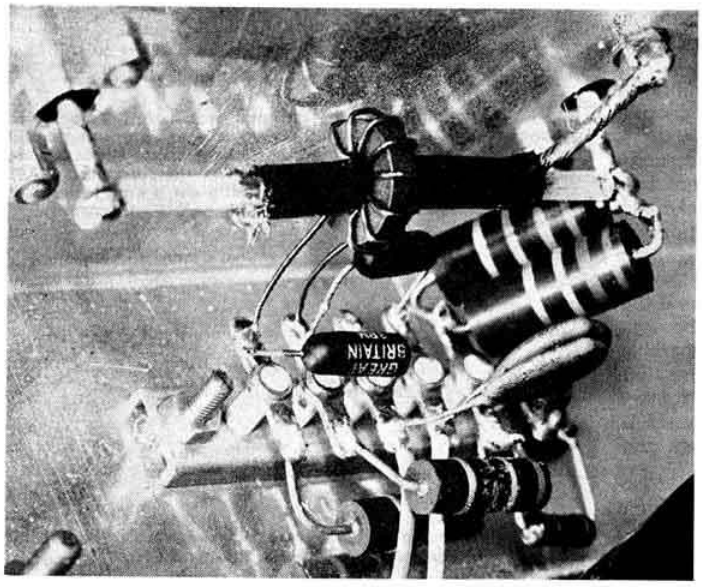


Fig 9. Details of the sensing circuits of the unit described in Fig 8.

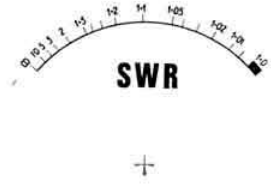


Fig 10. Scale for the unit shown in Figs 8 and 9, for a 75 ohm system. The swr scale is for forward powers between 50 and 500 watts.

under matched conditions. VR1 provides fine adjustment of the ratio. Absolute values of R1 and R2 can be varied considerably, bearing in mind that as the values decrease their dissipation increases, and that as their values increase the stray capacitance appearing across them may need to be compensated for.

Useful Equations

Let the line current be I amps, the line voltage be V volts, and the characteristic impedance of the transmission line in use be Z_o. Then $V = IZ_o$.

If the current transformer ratio is 1:n, and each of the resistors in its secondary circuit has a value of r ohms, then the rf voltage across each of these is given by:

$$V_{(i)} = \frac{Ir}{n} \qquad (3)$$

The voltage detector output is obviously

$$V_{(v)} = \frac{R_2}{R_1 + R_2}.V = \frac{R_2}{R_1 + R_2}.IZ_o$$

which is, to a good approximation,

$$V_{(v)} = \frac{R_2}{R_1}.IZ_o \qquad (4)$$

The main design equation for all the instruments is therefore

$$R_2 = \frac{r.R_1}{n.Z_o}$$

where the value for R2 includes the effect of VR1, if fitted. The dissipation of some of the components specified is quite high. For those planning to design different circuits, the following equations express the dissipation of R1 and the current transformer resistors, r.

$$W_{(R_1)} = \frac{Z_o.W}{R_1} \text{ watts,}$$

where Z_o is the characteristic impedance of the transmission line, and W is the transmitter output power.

$$W_{(r)} = \frac{W.r}{n^2.Z_o}$$

where n is the current transformer ratio. In the instruments described, $W_{(R_1)}$ is about 5 watts, and $W_{(r)}$ 2 watts for a transmitter power of 500 watts.

Calibration

If the linear or logarithmic wattmeters, or the direct-reading swr meter, are built exactly as described, and used in systems of the correct impedance, the calibration given in Figs. 2, 7 and 10 will be sufficiently accurate for most purposes. For those devising their own circuits, the following procedure is recommended.

Accurate calibration of any of these instruments requires a high power rf source (a transmitter) and an rf voltmeter. The instruments can be *reasonably* calibrated without the rf voltmeter.

The wattmeters are calibrated by feeding power through the meter into an appropriate dummy load (50 or 75 ohms). VR1 is adjusted for minimum reflected power indication, and the power scale is marked according to the rf voltage appearing across the load.

If an rf voltmeter is not available, a peak-reading type can be made with a diode, capacitor and dc voltmeter. Alternatively it is possible to infer the peak line voltage from the dc output of the forward voltage detector, which can be measured with a high impedance dc voltmeter. As the detector output is equal to the peak rf voltage applied to it, equation (4) leads to

$$V_{det} = 2{\cdot}8V\frac{R_2}{R_1} = 2{\cdot}8\sqrt{WR}.\frac{R_2}{R_1}$$

where V and W are line voltage and power as before and R is the load resistance.

It would be difficult for most amateurs to obtain sufficient high power carbon resistors to calibrate an swr meter by means of deliberate mismatching. An indirect method is therefore proposed.

Disconnect R3 and R4 (Fig. 8) from the detectors, and connect them instead to two variable dc supplies. Set the supply connected to the forward circuit to +20 volts*, and plot the meter reading as the second voltage is varied between zero and +20 volts. The ratio of these voltages corresponds to a definite swr, which can be determined from equation (1).

Before carrying out this procedure, however, VR2 should be adjusted for full-scale deflection of the meter under matched conditions at the highest level to be encountered.

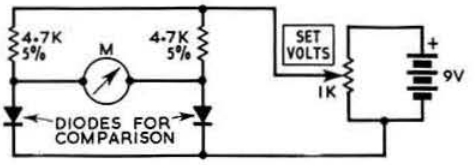


Fig 11. Bread-board circuit for comparing the logarithmic properties of silicon junction diodes. The meter should be as sensitive as possible (such as an Avometer on the 50 micro-amp range), and should not deflect appreciably from zero as the voltage applied to the circuit is increased from zero to +9 volts.

Conclusions

All of the instruments described in this article have been tested under actual operating conditions. Maximum power levels used varied from 100 watts at 2 MHz and 300 watts at 28 MHz, to 1200 watts at 3·5, 7, 14 and 21 MHz. With the components specified the instruments will sustain power levels well above the kilowatt level for periods of tens of seconds.

Anyone who has used a reflectometer (of any type) will testify to its usefulness in establishing correct loading conditions. If all transmitter output power is known to be travelling up the feeder and not being reflected at the far end, it must be radiating somewhere.

It is hoped that by introducing frequency independent directional wattmeters, one will be able to make useful comparisons of absolute power levels. The logarithmic scales are an added convenience, and the direct-reading swr meter offers a saving in meters.

The small physical size of the rf sampling networks makes these devices ideal for incorporating into transmitters and transceivers. All that is needed is an extra position on the main meter switch.

* This corresponds to a power of about 500 watts in a 50 ohm system.

REGULAR FEATURE

THE MONTH ON THE AIR

By JOHN ALLAWAY, G3FKM*

THE perennial problem of stations using telephony in the parts of our frequency allocations which are accepted by gentleman's agreement to be reserved for cw use is raised in the May issue of the First Class CW Operators' Club's *News Sheet*. G8VG reports having a list of over 100 UK stations who have been heard using phone between 7000 and 7030 kHz. As he points out, some newly licensed stations may not be aware of the European Band Plan, but quite a number on his list have two letter callsigns and should be aware of the situation. We are extremely fortunate in the UK in being given complete freedom to use whichever mode we wish in any part of our LF and HF band allocations and the plan was drawn up and agreed by all the European IARU Societies as a voluntary way to prevent what would otherwise have been a chaotic situation. This is a much better way than in some of the world's major countries where exact frequency restrictions are laid down in licence conditions. For the benefit of new readers the exclusive cw areas (under the European Band Plan) are as follows:

3500–3600 kHz	21000–21150 kHz
7000–7040 kHz	28000–28200 kHz

14000–14100 kHz (RTTY uses the area around 14090 kHz)

No telephony transmissions should be made in these band segments.

Complaints are being received about the non-arrival of QSL cards from the 3V8AA expedition which took place eight months ago. Your scribe would be interested to hear from those who sent their five IRC's to F5OJ without result.

Readers will be sorry to learn that HB9ADO, Charles L'Eveque, joined the Silent Keys on 11 April last. He was of course at one time 4W1ADO and his QSL's were dealt with by F8RU. Another well known overseas amateur, K5QWZ, a prominent member of the Ex-G Radio Club and originally from Liverpool passed away during April after a prolonged spell of ill health.

News from Overseas

A letter received from Roger Hill, ex-8P6CB, says that his callsign is being pirated and that he has now returned to the UK and hopes to have a G call soon.

GI3PLL, ex-5R8AO, is now back home in N Ireland having enjoyed his two month stay in the Malagasy Republic. He managed 300 QSOs with some 60 countries, most of these were on 14 MHz as his equipment was found to be unusable on 21 and 28 MHz. He managed to work three Europeans on 3·5 MHz. Roger says that so few G's were heard that it really was an event to raise one and in fact he only managed to have four satisfactory contacts with the UK. He mentions the great kindness shown to him by 5Z4KH and his wife during his short stay in Mombasa.

G3BAA has now arrived in Hong Kong, and has been allocated the call VS6AH. Stuart asks for QSL's via the address in *QTH Corner*, previous calls held by him were SU1SB, VK2AHO, and 9M2BR.

VS6AJ/P will once again be on the air for NFD. This time a new site, one of the highest spots in the Colony, will be used. A test run was to have taken place during the WPX contest. VS6DR, reported to have worked 248 countries during his first eight months in Hong Kong, has now started on 6 metres and has worked KG6 towards his 6m. DXCC! The first VS6-CR9 2m contact was made between CR9AK and VS6EF a few months ago during a visit by VS6AD to Macao.

During a contact with your scribe Frank, DL7FT, described the difficulties which he encountered during his recent visit to Monaco. He operated from the QTH of 3A2CN, but found that TVI was an insurmountable problem due to the existence of TV sets with 28 MHz i.f.'s in the Principality. This restricted his operating time very severely. DL7FT is currently the QSL manager for the following stations: EA6's AR, AS, BG, BH. HB0LL, HS3RB, KL7EBK, KR6JT, TU2AY, TU2AZ, TU2CR (wife of TU2AY and latest TU licensee), W4UAF/KH6, 3A2CN, 3A2EE, 3A0CU, and 3V8BZ. He has had to give up handling cards for TG9EP and XE2YP. It is emphasized that all stations applying for cards must include self addressed envelopes and IRC as no bureau facilities are available to Frank for these outgoing cards. Those who are unable to send return postage will be interested to know that Frank's small daughter is a stamp collector and that items for her collection would be acceptable in lieu thereof.

Mike Sayer, 9V1PK, has returned from Singapore and is now licensed as G3YJC. His old G8AJG call will not be used and 9V1PK will not be reissued although there is known to be at least one pirate already using it. Mike's new address is in *QTH Corner*.

DL5YP reports that his G3WTO callsign is being pirated on 160m. The person concerned uses am and calls himself Mike. The only time that the G3WTO call is used legally is as /M when its owner is on leave in the UK.

G3NKQ is now in Cyprus and started operating as ZC4CB on 1 May. He will be on 14 and 21 MHz mostly to begin with. QSL's may be sent via the bureau, via W2CTN, or to the address in *QTH Corner*.

9L1AT (formerly MP4BDN) will be returning to the UK at the end of May after a three month stint in Sierra Leone. He ran a KWM2 and 3OLI into dipole antennas. Tony's G call is G3LMT and he may be QSL'd via the address in *QTH Corner* (the Callbook address is not correct). Patience is requested from those awaiting QSL's.

* 10 Knightlow Road, Birmingham 17. Closing date date for the July issue is 10 June, for the August issue 15 July and for the September issue 5 August.

Members of Hong Kong ARTS and guests at a recent gathering.
Back row: X, VS, 6BS, 6DK, 6AF, 6AL, X, 6EF, X, 6DL, 6AP, 6BE, 6FX.
3rd row: 6FZ, 6AA, X, X, 6CO, 6DX, X, X, X, 6BF, X, X.
2nd row: 6DO, 6DR.
Front row: 6CJ, X, WB6UJO, WB6VBN, X, X, 6EK (Pres) X, X, X, 6AD.
SWL Digby.

Les Cooper, G5LC, now in Johannesburg is licensed as ZS6BDO and will be active on 10, 15, and 20 metres with his KW2000A and a TA33Jr. beam. His QTH is as listed in May *QTH Corner*.

Awards

The information given on page 187 of March 1969 *MOTA* concerning the **AJD, WAJA, JCC** and **HAC** awards from JARL did not make it clear that QSL cards should be submitted with all applications. It would appear from a letter received from JA1KIS (JARL Awards Manager) that a list of these certified by a national society's Awards Manager would be accepted. This is a most sensible arrangement and reduces the risk of losing cards and the cost of overseas postage.

Would readers please note that claims for the **Worked All Continents** award should be routed via RSGB Headquarters and not sent to ARRL? Applicants for the **WAE** and **EU DX D** should send their claims direct to G5GH (C. R. N. Emary, Westbury End, Finmere, Bucks.) and not to RSGB HQ. In this case there is no fee for the appropriate award but return postage must be enclosed.

From 1 January, 1970 the number of contacts required by those applying for the **Hong Kong Firecracker Award** will be increased from four to six except for applicants in Zones 18, 19, 23, 24, 25, 26, 27 and 28 who will need 10 instead of 8.

The **Hampshire County Award.**

Custodian, G2GM, Bay Sound, Freshwater Bay, Isle of Wight.

Issued by the Royal Navy ARS for confirmed contacts (since 1/10/60) with the County Boroughs of Portsmouth, Bournemouth, and Southampton, plus (for UK stations) 15, (for other European stations) 10, and for others five of the following municipal boroughs: Aldershot, Alton, Andover, Basingstoke, Christchurch, Eastleigh, Fareham, Farnborough, Fleet, Gosport, Havant and Waterlooville, Lymington, Petersfield, Romsey, and Winchester.

GCR list and 5s or six IRC's should be sent to G2GM (address above).

The **Worked All Britain Award.**

Custodian, Cannock Chase ARS.

Basic award for UK stations for confirmed QSO's with 400 of the possible 3960 " areas " in the UK including at least 40 of the 98 counties, all to have been since 1 January 1946. Any bands/modes may be used and any callsign the applicant has used may be used. UK " areas " are based on the National Grid 10 kilometre squares into which Great Britain was mapped by the Ordnance Survey system. A special " Worked All Britain " record book, consisting of 144 pages is available from John Morris, G3ABG, 24 Walhouse Street, Cannock, Staffs, price 10s or $1.50 post free. This contains a complete list of the reference numbers of the 3960 squares and a gazetteer listing of all the towns and large villages in each Area, as well as an application form and check sheets. Overseas applicants need 300 areas in at least 30 counties. QSL's should not be submitted but must be available if required.

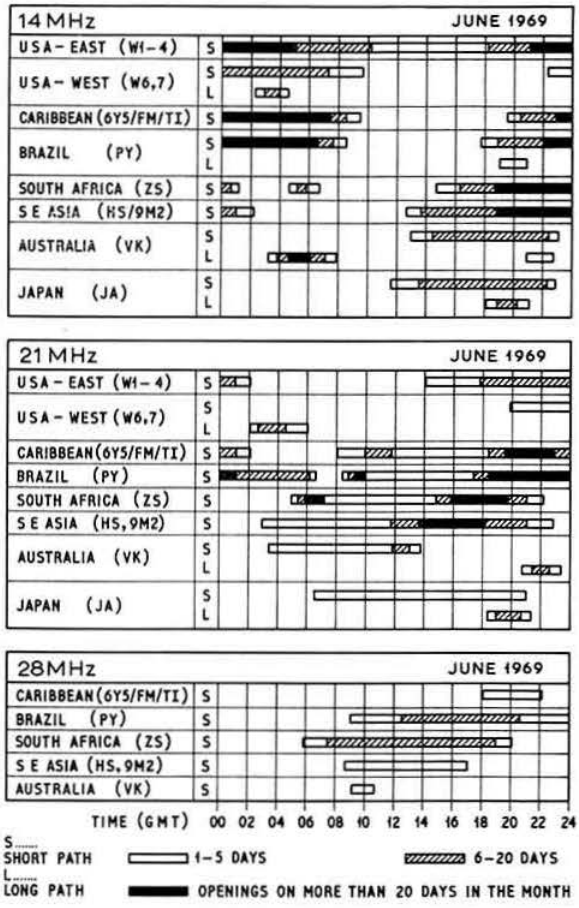
The basic " WAB " Award is based on the Union Jack and seals will be issued for higher classes. WAB/LF, WAB/HF, and WAB VHF Contests are planned to commence in 1970. Details will be published later, as will those of expeditions by mobile and portable stations. G3ABG will be pleased to provide the area number of any UK station on receipt of an sae, and it is suggested that this be put on QSL cards and given during QSO's. Any profit from this award will be donated to the Radio Amateur Bedfast & Invalid Club and the RSGB Building Fund, and no individual will receive payment for his services.

The **Prince of Wales Award.**

Custodian: GW3IEQ, P. H. Hudson, " Silhill," Dinas Dinlle, Llandwrog, Caerns.

Awarded for 1 QSO with GB2HRH (the special station marking the investiture of HRH. The Prince of Wales) plus contacts with other Welsh stations as follows: (DX applicants) 1st Class 15, 2nd Class 10, and 3rd Class 20 (in this case without a GB2HRH contact). (European applicants) 20, 15 and 25 respectively. All QSO's must be during 1969 and GB2HRH may be worked on each band for further credit and will count as another GW in these circumstances.

QSL's are not required but a certified list containing log data should be sent to GW3IEQ together with 5s or eight IRC's. This award is also available to listeners.



PROPAGATION PREDICTIONS

Summer conditions in the Ionosphere make June, July and August most unfavourable months for DX propagation because the F2 muf's are considerably lower than in the winter months.

On **28 MHz** even contacts with Africa and South America will not be certain. Contacts with North America and Japan will be very rare.

On **21 MHz** the unfavourable conditions will also be noticeable. North America, Australia and Japan will only be heard on days with above average F2 muf's. Contact with the West coast of North America will be possible in the early hours of the morning, and with Japan and Australia in latter part of the evening via the indirect path. Stations in Southern Europe will find better conditions than those farther north. Some compensation for poor DX conditions will be provided by the sporadic E short skip conditions during the summer months for distances of about 500 to 2000 km. These short skip contacts are possible because of sporadic E layer of high frequency.

In the summer **14 MHz** is particularly a night time DX band. This band will be open for traffic to North and South America during the latter half of the night. The most favourable conditions for traffic to South Africa will be between 19.00–23.00 GMT. As it is now winter in the Southern hemisphere atmospheric disturbances will be relatively low, and traffic with South Africa should be good during night time on 14 MHz.

On **7** and **3·5 MHz** the chances of DX during the night will be relatively low as the nights are short and atmospheric disturbances will be strong. The dead zone will not appear on 3·5 MHz even shortly before sunrise.

The provisional sunspot number for April was 105·2 with the period of greatest activity occurring during the period between 13 and 21 April. The predicted smoothed sunspot numbers from the Swiss Federal Observatory for August, September and October are 95, 93 and 92 respectively.

Massachusetts Amateur Radio Week.
01.00 15 June to 24.00 21 June.

A certificate signed by the State Governor will be awarded to all non-US amateurs who work at least two stations in the State during this period (any band/mode). Logs should be sent to Bill Holliday, 22 Trudy Terrace, Canton, Mass., USA, 02021, to arrive no later than 31 July. They should show date, time and frequencies of QSO's and a large sae and one IRC should be enclosed.

Top Band News

The latest *W1BB 160 Meter DX Bulletin* is the last of the 1968/69 " season " and summarizes the considerable DX achievements which have taken place since last autumn. It seems that trans-Pacific conditions were very poor, and that a very bad six week spell for trans-Atlantic contacts followed the contest in January. This resulted in the first completely blank " First Timer's " test for several years on 2 February. Stew points out the great importance of trying to secure 1825 to 1830 kHz as a space clear of stations in the USA so that DX signals may still have a clear spot now that the US frequency allocations have been increased on the band. All stations are respectfully asked to try to help to keep this DX " window " in the band clear, especially during times of likely DX openings.

HA5KFZ has heard JA3BDQ at RST349 so it would seem that contacts between Europe and Japan are possible. Keith, ex-ZD7KH, is returning to Kenya and hopes to get on 160 with his 5Z4 call sometime during his three year stay.

WNU, New Orleans, is on 2048 kHz and is suggested as a useful indicator of conditions.

Readers will be pleased to hear that Stew's wife Alice who sustained a serious heart attack in September is making good progress. She would like to thank all the 160m gang who have sent her " get well " messages. Your scribe would like to add his name to those of all RSGB members who hope that Alice's health will be restored to normal in the very near future.

Contests

The multi-operator single transmitter entrants from the British Isles in the **1968 CQ WW WPX SSB** Contest were as follows:

G3WYX (G3's HTA, RUV, RUX, TJW) **717,604 points.**
GC3VZT/A (G3VZT, G5's AFS, AKD) **650,000 points**

G3SSO (G2HDU, G8KG, G3's CNW, PEU) **338,100 points.**

G3SKY (G3's SDD, UCW, WIT, NTM, AFK) **116,616 points.**

G3EBH (G3's EBH, TGK) **60,915 points.**

A reminder that this year's **VK-ZL-Oceania Contest** will be a special event to celebrate the bi-centennial of the visit of Capt James Cook in October 1769 when New Zealand was annexed as part of the British Empire. This year's contest is being organised by N.Z.A.R.T. and will offer 40 silver shields mounted on polished wooden bases amongst the awards to be won. The dates will be 4-5 October (Phone) and 11-12 October (CW) Full rules will be given in a later *MOTA*.

Results of the **9th All Asian DX Contest** have now been received from J.A.R.L. UK scores were as follows:

	points		points
G4CP (All bands)	**7279**	**GM3CFS** (21 MHz)	**1284**
G3ESF (All bands)	4681	GM3SKX (21 MHz)	363
GD3AIM (All bands)	**540**	**G3PJW** (21 MHz)	**136**
G2AJB (All bands)	400		

Congratulations to the certificate winners (in bold type). This year's event will be the 10th and will take place as usual on the last weekend in August (10.00 30 August to 16.00 31 August). Special badges will be awarded to all participants and medals to continental high scorers. Full rules will be given later.

DARC Field Day 1969.

17.00 7 June to 17.00 8 June (Up to 25 watts cw only)

17.00 6 September to 17.00 7 September (Phone and cw).

All bands 3·5 to 28 MHz.

Exchange RS/T plus serial no. of QSO (from 001).

QSO's with fixed stations in one's own continent count two points, in other continents three points. QSO's with other portable stations count 4 and 6 points respectively. A multiplier is determined by the number of countries (ARRL and WAE) worked on each band totalled together. JA, PY, VE, VO, VK, W/K, ZL, ZS, and UA/UW call areas count as countries for this purpose. There are four classes: Class A for single operators running less than 25 watts. Only 18 hours operating time is allowed for this category, the six hour rest period must be taken in one period and clearly shown in the log. Class B is multi-operator stations with less than 25 watts. Class C the same but up to 200 W input, and Class D includes those with more than 200W input. The portable QTH must be located at least 100 metres from the nearest building and only batteries or generators independent of the mains may be used as power source.

Logs (separate sheet for each band) should show band,

Qth Corner

CR3KD	(Direct) Manuel S. Pardal, Box 64, Bissau, Portuguese Guinea.
DU1ZAG	via WB6GFJ, Ross Forbes, 12866 La Cresta Dr., Los Altos Hills, Calif, USA.
FO8BW	via W6JFM, 1715 Griffith Park Boulevard, Los Angeles, Calif, USA. 90026.
GC5AKO **GD5AKO** **GW5AKO**	via W1EGT, Stephen Mann, 18 Chipmunk Lane, Darien, Conn, USA 06820.
KC6BY	USCG Loran Stn., Yap,Western Caroline Is, 96943
KC6CS	via W7BUB, 660W 13th St., Mc Minnville, Oregon, USA.
KS6CX	via K4ADU, 5330 Buena Vista Rd, Columbus, Ga, USA 31907.
KX6AS	Box 866, APO San Francisco, Calif, USA 96555.
DL4QQ/PX **WA6QGW/PX**	via K6VVA, 1634 Creek Drive, San Jose 25, Calif, USA.
TA2E	via VE3ABG (new QTH) Box 35, Stn " S," Toronto 20, Ontario, Canada.
VK9LB	c/o Berry Research, Box 287, Norfolk Is, via Australia.
VP5TH	US NAVFAC, FPO, New York, NY, USA 09558.
VQ9/A **VQ9/A/D**	via W4ECI, 3101 Fourth Av South, Birmingham, Ala, USA 35233.
VS5MC	see 9M6MC
VS6AH	Stuart Bridgman, A 15 Carolina Gardens, 20 Coombe Road, Hong Kong.
ZC4CB	Fl. Lt. C. R. Burchell, Officers' Mess, RAF, Akrotiri, BFPO 53 (or viaW2CTN).
ZF1DT	(17/5 to 24/5) WB4BND, 11120W. Biscayne Canal Rd, Miami, Fla, USA, 33161.
ZS3HX	A. G. Judd, PO Box 185,Windhoek, SW Africa.
5R8AH	PO Box 135, Tulear, Malagasy Rep.
5W1AD	Len Swift, Box 1877, Auckland, New Zealand (only QSO's withW9WNV dealt with by W0BN).
9L1AT	G3LMT, 2 Warwick Close, Honiton, Devon.
9M6HM	c/o Police HQ, Kota Kinabula, Sabah, Malaysia.
9M6MC	via VS6AA, Capt. M. J. Caplan, 252 Sig Sqdn, BFPO 1.
9U5DS	via W2LGU, 484 Valley Place, Englewood, NJ, USA.
ex-9V1PK	Mike Sayer, 8 Canute Drive, Bransgore, Christchurch, Hants.

RSGB QSL Bureau, G2MI, Bromley, Kent.

COUNTRIES TABLE

	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G3LNS	—	91	112	171	143	123	640
G3HCT	—	85	73	47	61	111	377
G3JVJ	12	68	16	53	12	2	163
G3UML	—	63	22	101	23	18	227
G3XBY	2	36	37	51	52	43	221
G8VG	2	24	26	28	41	44	169
G3TZU	1	28	26	45	84	139	323
G3WPO	17	10	37	31	1	23	109
G4RS	4	21	6	50	51	17	149
G3IAR	2	23	21	25	23	26	120
G3PQF	6	13	12	30	8	5	74
G3VPS	3	15	15	61	27	20	141
G3KS	1	16	11	61	45	48	182
G3VLM	1	9	7	28	—	18	63
G3VUM	4	4	8	70	51	57	194
G3PEJ	—	2	18	34	43	33	130
G3VJG	—	2	18	5	5	40	70
G3XYP	—	—	37	134	72	63	306
A6148	7	49	45	84	24	67	276
BRS31164	4	49	41	111	90	64	360
BRS24529	4	48	63	140	69	56	380
A5662	18	28	27	102	97	85	357
BRS25429	4	39	39	79	48	30	239
A6337	4	38	25	89	70	35	261
BRS27806	6	35	20	67	64	4	236
A5390	9	30	47	144	117	98	445
A5154	2	35	16	103	73	62	291
A6923	4	29	14	54	40	27	168
A6201	—	31	10	48	—	—	89
A6003	5	25	24	45	90	61	250
BRS30694	7	23	28	60	77	43	238
A5466	8	22	25	38	21	28	142
BRS28198	2	27	32	1	—	20	82
A6254	6	22	14	114	129	77	362
A5489	—	18	8	57	55	25	143
A6248	1	17	11	68	29	1	127
A6498	4	14	2	17	8	11	56
A6220	1	15	21	56	13	14	130
A6553	1	12	8	19	53	56	149
A4253	1	12	7	19	20	9	68
A6098	4	5	12	29	—	—	50
A6278	1	6	7	113	22	5	154
A6179	1	5	10	25	5	3	49
A6144	—	4	15	62	—	—	81

(This month's table is in order of 1·8 plus 3·5 MHz scores)

exchanges sent and received, time, calls, points and multipliers claimed, and also a summary sheet giving the entrant's name and address in block letters. They must be sent to arrive no later than 22 June for the European FD and 21 September for the Summer Field Day to: DARC DX Bureau/Field Day Manager Norbert Meyer, Wittener Strasse 329a, D 463 Bochum, W Germany.

In the First " Giant " RTTY Flash Contest **G3MWI** was world second with 29,590 points, being only narrowly beaten by W2RUI. The only other UK entry was G3IYG who was 35th with 1628 points. In the SWL section second, third, and fourth places were occupied by Colin Jones, Alexander Morton, and Richard Coates (all UK) and BRS26140 was sixth.

DXpeditions

According to *Long Skip* Don, VE6MY, expects to return to the Pacific area either about the time this is being read, or in 11 months time. This time he hopes to visit 9 locations, seven of which are rare and the other two new countries which are said to have never been activated before. When he has finished in the Pacific Don then intends to move to " other areas of interest".

VK2BFI is said to be planning a trip to Ball's Pyramid Is (a few miles away from Lord Howe Is). No further details are available at present.

An expedition by the Nevada DX Association (K7ADD and W7GVA) to some of the rarer European countries is forecast to take place between mid-July and mid-August. Two complete 3·5 to 28 MHz stations will be available and special attention will naturally be given to contacts with the Western USA. Possible targets for the expedition to operate from include GC, HB, LX, PX, and 3A. The QSL situation will be looked after by W7CRT.

It is rumoured that VU2DK will be visiting the Laccadive Is. during August.

Maurice Caplan, VS6AA, will be visiting Brunei during the latter half of June and will be staying with VS5MH. He hopes to be able to use the callsign VS5MC whilst there, and it is also probable that he will spend one weekend (probably 21/22 June) in Labuan (9M6). The whole trip is dependent on suitable flights being available.

According to the *West Coast DX Bulletin* WB6's IWS and KBK will be making a trip to Roncador Cay between 15 June and 21 June. This is in the Caribbean and near to Serrana Bank (KS4) for which it counts for DXCC purposes. The same publication says that XE1J believes that one of the islands in the Revilla Gigedo group (XE4) may have the necessary qualifications required to be a " new " country and is currently checking with ARRL. If he receives a favourable reply an expedition there may be mounted this autumn, if not another trip to XE4 is likely to take place.

W6JFW will be on the air from Tahaa Is. between 5 June and 10 August using the callsign FO8BW. He hopes to put in some time on 10, 15, 40 and 80 metres as well as on 20m. where he is known to have a sked with W6JR on 14,260 kHz at 04.00.

Considerable confusion seems to exist concerning " 1N2A" who was active around 4 May. Overseas bulletins refer to " Marco Is " in the Pacific Ocean but your scribe believes that the operation was supposed to have taken place from an island in the Amazon river at a point where the frontiers of Colombia, Peru, and Brazil meet. According to the National Geographical Society Atlas (1966 edition) this island is called Ilha Aramaca and belongs to Brazil.

It seems that thanks to the efforts of Senator Goldwater (K7UGA) (and others) there is a possibility of some amateur radio operation taking place from Navassa Is (KC4) during one of the twice yearly official visits to the island by the USCG *Hollyhock*. The next of these visits is scheduled for early June and several US clubs are said to have received permission to operate for 4/5 days on all bands.

Gus, W4BPD, seems to be encountering more than his fair share of trouble during his travels in the Indian Ocean area. After another difficult sea journey he reached Desroches Is and operated as VQ9/A/D for two days, managing 1300 QSOs. He was then obliged to return to the Seychelles because of trouble with his generator. Your scribe is wondering why Gus should be using such strange callsigns—VQ9/A being a prefix with a suffix denoting operation from an alternative address!

The expedition to Aves Is. (YV0) has been postponed until after the hurricane season and is now unlikely to take place until late in the year.

Expeditions

G3ING is scheduled to be on the air from Montgomeryshire during the period 1–3 June, and from Radnorshire from 5–7 June. He will be mostly on 160m after 19.00 using a KW2000A and a trap dipole. QSL's for GW3ING/P should be sent to G3ING.

G3SVK and G3VUE will also be visiting Wales for the benefit of the county hunters and hope to be GW3SVK/P and GW3VUE/P respectively from Pembrokeshire (17–18 June), Cardiganshire (19–20 June), and Radnorshire (21–22 June). All bands will be used and callers are asked not to tune up on the expdition's frequency, not to break into established QSOs, and to be brief! QSLs should be sent with sase direct to G3SVK or G3VUE or via RSGB. Trips to GD and GM are under consideration for later in the year.

DX News

CR3KD is expected to become active on ssb in the near future when he receives an HW-32 transceiver. QSL's may be sent via W2CTN or to the address in *QTH Corner*.

HL9KQ points out that it is inadvisable to send QSL's for HL9 stations via the ordinary Korean bureau which caters only for the holders of HM calls. Cards for HL9 calls should be sent to: QSL Bureau AC of S, C-E, APO San Francisco, Calif., USA 96301. unless a specific request is made to QSL via KARL.

Current activity from the Caroline Is includes KC6CS, and KC6JC who are both located on the Eastern group, and KC6's AS, BY, and CT on the Western group. All have been reported on 14 MHz ssb recently.

VK9LB is now on the air from Norfolk Is and has a good signal on 21 and 14 MHz. He will be there for a year and VK9LA is also on the island. VK9XI, Christmas Is, is very active and is often a good signal on 21 MHz ssb during the afternoon. VK9RJ, Nauru Is, is said to have a schedule with WA6AHF every Saturday at 06.00 when he transmits on 14,170 kHz and listens for WA6AHF on 14,220 kHz. The series of prefixes C2A–C2Z is said to have been allocated to Nauru so that VK9RJ may be found using an unfamiliar callsign in the near future.

ON4IARU was on the air for the duration of the IARU conference in Brussels between 4–11 May.

W4BRE has been compelled by pressure of business to

relinquish his task of QSL manager for 7P8AR. In future call cards should be sent direct to U. W. Dehning, PO Box 194, Maseru, Lesotho.

A net for British Commonwealth stations only meets regularly at 14.30 daily on or around 21,354 kHz. 9V1PA, VK9XI, and other well known Far Eastern stations are regularly in attendance and UK stations are welcome to join in.

In future visitors to the Philippine Is will be allocated call-signs in the DU1ZAA-DU1ZZZ series and the DX prefix reserved for portable DU stations. However it is understood that DX1's AAV, BJ, and HM1 will be allowed to retain their calls.

WA4PUC/HS made 1064 contacts with 106 countries during his short period of activity from Thailand. There is a possibility that WB2WYX/HS may appear on the bands in the near future.

FK8AC is expected to operate from Wallis Is. (FW8) for a spell about mid-June. CR5SP is now back in Portugal, but expects to return to Sao Thome in December.

Band Reports

The movement towards summer conditions has been very noticeable during the last month, and high static levels have been in evidence at times on the l.f bands. At the other end of the spectrum there has been a very marked deterioration on 28 MHz, although on some days there are many Japanese signals on the band during the morning and such choice items as VR2DK have been worked. 21 and 14 MHz have remained as carriers of most of the DX signals with the latter band open all night on some occasions.

Many thanks are expressed to the following for providing the information from which this section has been compiled: G2HKU, GW3AX, G3EKN, G3HCT, G3HDA, G3IGW, G3JVJ, G3LNS, G3PQF, G3TZU, G3URX, G3USA, G3VIE, G3VPS, G3WNT, G3XYP, G8DI, G8JM, G8VG, BRS30694, BRS31164, A6023, A6098, A6144, A6148, and A6248. Stations listed in italics were on cw, all others on ssb (unless otherwise stated).

3·5 MHz. 02.00 LU7's ACB, XBM. 8P6AH. **05.00** TI2HP. **19.00** *UF6CW*, ZS3AW. **20.00** *VK2EO*. **21.00** MP4's BEU, TAF etc., YK1AA. **22.00** KR6KT, VO1FX, *VP8JT*, VP8KO, 9M2YB. **23.00** CR4BB, CR6IV, EP2BQ, FR7ZG, VP2AA, ZC4AK. **24.00** *DL4QQ/PX*, TA1SK.

7 MHz. 01.00 9Y4's AR, KR, MM. **05.00** *HI8IBC*. **06.00** CO2DC, CP6DW. **07.00** *CO3DB*, HP1JC. **13.00** 4U1ITU. **20.00** *ZE3JJ*. **21.00** PJ7JC, 5Z4LS. **22.00** MP4TAF, ZB2I, ZD9BE. **23.00** CE3CZ, CR4BB, *VP8JT*, VP8KO.

14 MHz. 06.00 KJ6BZ, ZL3ABJ/C (Chatham Is), 5W1's AD, AL, AS. **07.00** FO8's BS, BY. *KH6IU*, KS6CY, VR6TC, WB2IQK/MM (US survey ship "*Elanin*" nr Macquarie Is—uses KC4AAA callsign below 60°S). **08.00** KC6CT (W Carolines), KW6GJ, VR2FT, *YS1AG*, 5W1AR. **10.00** HV3SJ. **16.00** *JT4KAA*. **17.00** AP5HQ, YB0AR. **18.00** *DU1OR*, HH9DL, LG5LG, VS9MB, *4S7EC*. **19.00** *A2CAU*, ZS3R. **21.00** PY0RE (Trindade Is.), VP8KO. **22.00** JX4YM, *KV4AA*, VP2MW, G2MI/VP9. **23.00** CR3KD, TA1KT, XW8AX, *ZF1AA* (QSL via K2OLS). **24.00** *AP5HQ*, *PJ8WW*, KL7's and W6's.

21 MHz. 07.00 JT1KAA. **09.00** *KH6GNE*, *KS6CX*, *KW6EG*. **10.00** EA9EJ (Rio de Oro), KJ6BZ. **11.00** PX1AA (QSL via W2CTN), VK9LB (Norfolk Is), YA2AR. **12.00** KX6AS, *OA4DX*. **13.00** KC6JC. **15.00** MP4MBJ, VK9KY (Cocos Keeling Is), 5R8AM, 7X0RW. **16.00** VQ9/A. **17.00** *EA9AQ*, FR7ZL/T (Tromelin Is). VK9XI, VQ9/A/D, YB0AAB, 5R8AX, 9G1GK. **19.00** VP8KO, VS9MB, YB1BM, ZP3AL. **20.00** *FG7XT*, ZF1QW. **22.00** *CE3ZW*, *HI7JMP*, *PJ7VL*.

28 MHz. 11.00 *VR2DK*, *XW8BP*, ZD8's AR, JW. **12.00** *TA2FM*, *4S7DA*. **13.00** VQ8CG, *YA1AR*, 9X5AA. **14.00** *HL9KQ*, VK9BB. **15.00** TL8GL. VS6AL, VU2VZ, 9N1MM. **16.00** G3AAE/ZS6, 9L1AT. **17.00** VP2AA, VP8KD, VQ9C, 4S7PB. **18.00** VQ8CPR, 5L2AK (Liberia). **19.00** KV4CI (am), ZD9BE.

Many thanks to all correspondents and particularly to the following for permission to reproduce information from their publications: **DX News Sheet** (*Geoff Watts*), the **Ex-G Radio Club Bulletin** (*W3HQO*), the **DX'ers Magazine** (*W4BPD*), the **Florida DX Report** (*K4GRD*), **CQ DX** (*ARI*), **NARS Newsletter** (*5N2ABG*), **Long Skip** (*VE3HJ*), **QUAX** (*SM4-DXL*), **On the Air** (*ON4AD*), and the **West Coast DX Bulletin** (*WA6AUD*).

Please send all correspondence **to reach** G3FKM no later than **10 June** for the **July** issue, **15 July** for **August** issue, and **5 August** for **September** issue. Please note the early closing date for September.

FOUR METRES AND DOWN

By JACK HUM, G5UM*

". . . use your valuable allocations": Colonel Severin at the VHF/UHF Convention Dinner.

Reporting the Fifteenth VHF/UHF Convention

"USE OR LOSE"

IT is now known that a world Administrative Radio Conference concerning the Space Service and Radio Astronomy and convened by the International Telecommunications Union is to be held either in late 1970 or early 1971. The last Space Service Conference was held in 1963 and it was on this occasion, through the work of IARU Region 1 and the RSGB, that amateurs secured the right to use artificial satellites in the 144–146 MHz band. However, the needs of space communications have expanded so much since then that already another look is to be taken at allocations devoted to space. In this context amateur frequencies could come under attack—especially in the allocated bands above 28 MHz right up to 22 GHz. The radio amateur movement of the world must therefore be united to present a strong case for the retention of existing frequencies and to provide additional space communication facilities for amateurs in future. Above all we must use, and use fully, the allocations given to us now.

Well, what *will* happen in '71? No one can tell at this juncture. "Nobody in the UK wants to take away any of your bands, but what will the other countries do?" said Col. Severin, speaking at the VHF Convention Dinner at Whitton on 26 April. So far as UK amateurs' requirements were concerned the RSGB would be consulted. "The RSGB is the amateurs' voice in international and national affairs, and all UK amateurs should support it as their national society."

In the particular context of the VHF/UHF Convention it was appropriate that Col. Severin should remind the assembly of the increasing frequency congestion in the metre-wave spectrum. "There is an enormous demand for frequencies for mobile radio, for the police, for point to point and for numerous other services. Why am I telling you this? When you have a valuable allocation use it to the fullest extent and for experimental work."

In his reply to the Colonel's toast to "The Society" President John Swinnerton, G2YS, epitomized the speech in three words: "Use or Lose." He emphasized the need to persuade those now on the hf bands to help people the very highs.

We will leave readers to reflect on these words for the time being. There will be a deal more to say about them later.

Other speeches at the VHF Convention banquet were by G3BPT, proposing "The London UHF Group" (with recollections on how it sprang from the South London UHF Group back in 1946. The reply was by G4KD); and by G6NZ to "The Visitors," with special reference to the good

* Houghton on the Hill, Leicester LE7 9JJ. Send reports for the July issue to arrive by 16 June and for the August issue by 14 July.

news that Dr J. A. Saxton, head of the Radio Research Station, had agreed to be President Elect, 1970. Dr Saxton in making reply congratulated all concerned on the way the Convention moved from strength to strength each year. He disclosed that it was through being invited to an earlier Convention that his interest in amateur radio vhf activities had been sharpened.

Earlier, Fred Lambeth, G2AIW, paid a moving tribute to the late G6CL, and all stood to observe a minute's silence to the memory of one who was a dogged fighter in the amateur cause at international conferences.

Three presentations were made towards the end of the proceedings. "The 1962 VHF Committee Trophy" went to G5AHK for a solid state ssb transceiver for 2m that achieved a truly amazing degree of compactness. The judging committee were unanimous in awarding it top place, said Chairman Geoff Stone, G3FZL. "The G5RV Trophy for Space Communication" went to Ron Ham, BRS15744, whose work in this area will be well known to all who read "Four Metres and Down." The " Horace Freeman Trophy " for the best piece of home constructed equipment entered in last Autumn's Communications Exhibition went to G8ACC, and with it a cheque as well, for Sven Weber had also been awarded the "Norman Keith Adams Prize" for technical writing for this journal.

Ron Ham's enthusiasm for radio astronomy was made manifest during the Convention afternoon lecture session, in an address "Listening on VHF" that reviewed almost the whole of post-war amateur metre-wave activity in these islands, discussed the many modes of propagation which the listening member could study, and reiterated the importance of linking amateur radio and amateur astronomy investigations.

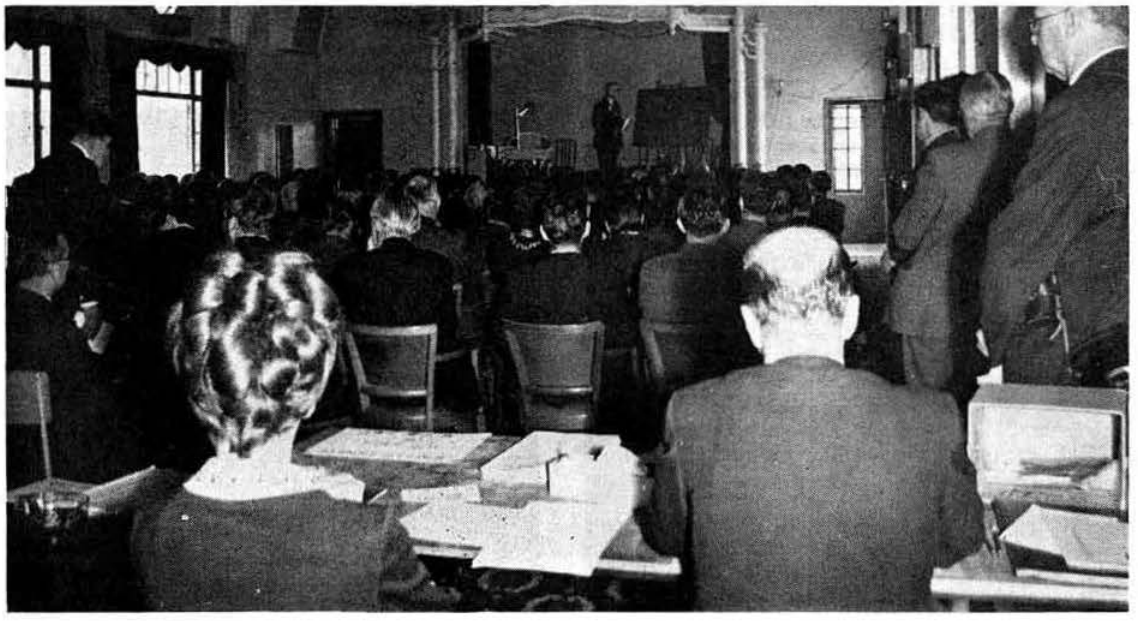
This year for the first time at Whitton Conventions lectures were divided into two streams running concurrently and broadly regarded by most visitors as "popular" and "technical." While Ron Ham was speaking a parallel lecture

The G5AHK all solid state phasing rig for " Two " earned top marks in the Constructors' Competition, and " The 1962 VHF Committee Trophy " for Dietrich Dall.

. . . AND THE NEXT CONVENTION

—is Saturday 14 June at Wolverhampton (full details last month, page 339). If you have not got your ticket contact G8AEV or S. W. James, programme sec., 20 James Rd., Kidderminster.

The Convention afternoon tech-session opens with the G3BA lecture on VFOs at VHF. Later, the tech-talks divided into two streams, popular and advanced. The foreground backs belong to G3SGN (Mrs. Geoff Stone) and G3GMY, checkers-in at the door.



was going on in the main hall on " A Spurious-free VHF Receiver " delivered by G3MED, which followed "VHF/SSB Phasing Transceivers " by G3HBW. Other lectures covered FET converter design for " Two " and " Four " by G3VFD and G6HD, with plenty about the newer 3-electrode devices which are now getting around; and the application of semi-conductors to transmitter circuitry was the subject of a talk by G3OOU.

The last of the " tech lectures " was by G3FZL on " Measuring Spurious Radiation down to 90dB"—and if you can't get it down to that level when using ssb on vhf then you won't be loved by your neighbours. The Convention lecture programme would have been incomplete if it had ignored this highly contemporary and contentious subject, which was sparked off by last Autumn's debate about it in " Four Metres and Down " and fully ignited by the November IEE lecture. Geoff Stone harked back to that lecture to thump home the size of the problem of reducing in-band and out-of-band " dirt." Using a magnificent array of test gear he gave a practical demonstration of how to clear it up.

The vital need to avoid the generation of spurii also emerged from the first lecture that afternoon. Tom Douglas, G3BA, discussing VFOs for VHF, took his audience from the simple VXO through to latter-day mixer master oscillators, and imparted plenty of practical design information on the way.

* * *

In sum, Convention '69, left all of us with plenty to think about and plenty to build, if we are so minded—which after all were its purposes.

To the morning exhibition and equipment sales and the afternoon double-tier lectures 157 went, to the Dinner 133. At these attendance levels The Winning Post was comfortably but not suffocatingly full. It's good to know that it has been booked already for 1970, as was announced by G3FZL at the end of the feasting. The date to write in on the last page of the 1969 diary for transference to the 1970 one when it is received is Saturday, 25 April, 1970.

California Again on "23"

Towards the end of April, when it was calculated that the moon would be in the window of the 100 ft dish at WIFZJ/KP4 in Puerto Rico, a special listening watch was kept by Peter Blair, G3LTF, at Chelmsford, in the anticipation that there would be some tests forthcoming on 432 MHz. And there were. The KP4 station peaked at 7·5dB over noise in 100 Hz bandwidth.

The receiver used at G3LTF had a 2·5dB transistor preamp mounted on the focus of the 15 ft dish, with dipole feed.

Even more rewarding was a two way exchange of callsigns and reports between G3LTF and WB6IOM on 1296 MHz. With the new 16 ft reflector in use at the Californian end signals peaked at 12·5dB at Chelmsford. The signals from G3LTF were 5dB above audible threshold at WB6IOM. Each station could hear his own echoes from the moon.

* * *

On 24 May, when the moon was at a declination of plus 10 degrees at 2000 GMT, there was a plan by WB6IOM to initiate " a world wide EME test," with invitations to any stations suitably equipped to participate—" suitably equip-

". . . it's my pleasure to propose the toast to the Visitors ": G6NZ.

". . . I'm delighted to reply ": Dr. J. A. Saxton, head of the Radio Research Station (he is RSGB President Elect, 1970).

G3HBW opening the " advanced " session with his lecture on VHF/SSB Phasing Transceivers (Photography by G3LEI).

ped " means having the capability to punch 100 kW erp in the direction of the moon.

For identification purposes an elaborate and precise system for sending automatic dash codes has been evolved by WB6IOM, with morse identification to be sent at the beginning and end of transmission.

. . . and the next band up

On 11 May the magic 100-mile hop on 13cm was achieved by that determined pair G3EEZ/P and G3BNL/P, respectively on Clee Hill and in the Chilterns 8 miles south of Aylesbury. Signals by pulse mode were received at the northern end RS58 and at the southern end RS59.

What made the expedition especially worth while was the success achieved by the use of narrow band techniques as well as pulse. Both G3BNL/P and G3MCS not far away from him were received 569 and 559 up at Clee.

Previous tests over a 50-mile path had yielded RS58 with narrow-band but RS59-plus-30 on pulse, in spite of comparable sensitivities in the two receivers used (and here invaluable performance checks were done by G3OAD, who has been closely identified with the EEZ-BNL tests for many months).

Commenting on these findings G3EEZ says: " This does not mean that pulse is superior to narrow-band in mode, since if the receiver intermediate frequency were to be tailored to suit nb it would probably yield similar signals; but this would mean a bandwidth of 500 Hz, and the current state of the art at 2300 MHz would prohibit this. So I am inclined to think that at the moment the pulse mode offers a great deal in saving of equipment, and certainly seems on the tests so far done to afford better signals, with the if passbands necessary."

Further tests on 13cm are planned for the next few months, and to this end G3OAD has completed a 6 ft collapsible dish which should be a great asset on the portable forays where most of the 2300 MHz work is done.

* * *

Recollecting the pleas for more info about 13cm equipment, we are glad to have the following from G3OBD: the transmitter starts at 42·7 MHz in a 12AT7 osc-amplifier, trebles to 128·1 in a 3/10 and again to 384·3 in a 3/20A, with another 3/20A amplifier at 384·3. Then comes a 2C39A tripler to 1152·9 and a final DET22 doubling to 2305·8, delivering 1 watt. The receiver is a G3RPE converter into a tuning if of 24–26 MHz. The aerial uses waveguide feed into a 4 ft parabola.

Men O' Brass

We have said before (so have others) and we say again that if you really want to evaluate the potentialities of " Two " under normal conditions (and that means most of the time), try a spot of cw at the low end.

Supporting last month's comment by GM3TFY on the value of telegraphy under auroral conditions, Keith Fisher, G3WSN, of Chelmsford, makes the point that there should be more cw activity under *any* conditions.

" Perhaps we could start a cw activity evening " he suggests, and to get the brasses pounding he offers schedules at any time to likeminded telegraphy men, especially to those away to the north of him in Essex.

In the early days of " Two " brasspounders equalled phone-men where numbers were concerned, and phone-to-cw contacts were quite the normal thing. Maybe there should be more of them today in those circumstances where an A3 signal fails to climb above the noise to give consistent communication. It's worth remembering that cw is zoned for use anywhere between 144–146 MHz. Down at the bottom end, though, is the place where real weak-signal DX, telegraphy both ways, may be accomplished night after night at 100 per cent readability under conditions where even sideband would fail. And certainly there won't be any trouble with audio breakthrough into next door's telly.

BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG	Craigowl Hill, Dundee	145·950 MHz	A1	S
GB3CTC	Redruth, Cornwall	144·13 MHz	A1	NE
GB3GW	Swansea	144·250 MHz	A1	ENE
GB3GM	Thurso	144·995 MHz	A1	N/S
GB3GM	Thurso	70·305 MHz	A1	N/S
GB3GM	Thurso*	29·005 MHz	A1	Omni
GB3GEC	W. London	434·000 MHz	F1	N/W
G3SUT	Sutton Coldfield	433·8 MHz	A1	N/SE
GB3SX	Crowborough,Sussex*	28·185 MHz	A1	E/Omni
GB3VHF	Wrotham, Kent	144·500 MHz	F1	North-West

* Not operational

GB3VHF

The Society's vhf beacon transmitter frequency at Wrotham, Kent, measured by the BBC Frequency Checking Station (nominal frequency 144·50 MHz):

Date	Time	Error
29 April	1111 GMT	5770 Hz low
8 May	0955 GMT	5950 Hz low
13 May	1345 GMT	5830 Hz low

ZB2VHF is now operational on 50·0092, 70·311 and 145·1298 MHz. Reports to G3JHM.

Beacon News

Since last month's announcement about the advent of the Midlands 70cm beacon, reports have been rolling in from many distant parts to RSGB and to G3BA full of praise for this newcomer. With aerials beamed to the north and to the southeast it gives a service to those areas of maximum population where most of the 70cm activity occurs. Inevitably, there are areas which it would cover only if omni aerials were used at Sutton Coldfield, but the drastic reduction in range which would result would greatly lessen its overall value.

During May the device began radiating on the scheduled higher frequency of 433·98 MHz, using the local club callsign of G3SUT pending arrival of the GB3SC automatic keyer. The use of fsk puts a carrier on the channel all the time, much appreciated by members using the signal for converter tweaking.

Farther north, another 4m beacon (partnering ZB2VHF and GB3GM) has been commissioned at a none too good Sheffield site. Subsequent resiting will work wonders with the very welcome GB3SU.

From way down south at Gib there's news from ZB2BO that the aerials for the 6-4-2m beacon have arrived, and that the device itself was due to be delivered end-May.

Now further to Gib. . . .

Listen for ZB2 on "Two"

If by any chance the new ZB2VHF beacon on 2m penetrates to the UK the opportunity should be taken to check for the appearance of ZB2BO on the band. He is crystallized on 144·21, 144·52 and 144·91 MHz. With the season of ZB-to-UK possibilities well upon us he is now concentrating on 4m and 2m and is giving 6m a miss for the time being. His channels on "Four" are 70·196 (primary), with 70·26 and 70·47 also available.

He reports that ZB2BC is on 70·175 and 70·5, and adds: "We will call and listen on 4m whenever the band feels lively, a technique we are familiar with."

Another local is ZB2BL on 70·28 with a Pye "Reporter."

Contesting on "Four"

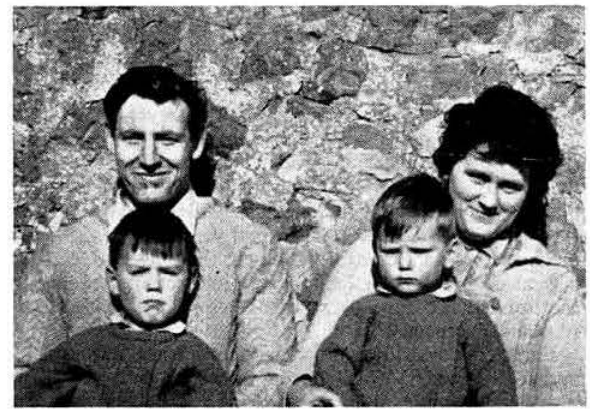
Television on Channels 4 and 5 inhibits 4m operation over a large part of the country. In these areas would-be participants in 70 MHz contests tend to abandon operations after lunch on contest-Sundays, which is when TV begins to be watched in earnest.

Many 4m men in affected areas will therefore be encouraged to learn that the 70 MHz Telegraphy Contest scheduled for 17 August will run from midnight to 8 am as an experiment. People in Channel 4/5 areas might care to give the VHF Contests Committee their views on this innovation, either before or after the event. May it promote a big turnout of 4m operators from all over the country, and not just solely from the south, which has been the pattern of all too many 4m contests up to now.

Three weeks earlier comes a north country 24 hour event. The Pennines VHF Group have organized a 4m contest that will run from 1700 GMT 26 July to 1700 GMT 27 July. A copy of the rules—they broadly follow those of RSGB events—can be had from G3RIK, 58 Beechfield Road, Milnrow, Rochdale, upon his receipt of an sae. It should certainly encourage some useful 4m activity at that time.

VHF PERSONALITIES No. 10

J. R. Davidson, GM3UAG, of Banff



Scotland has two north coasts. One stretches from Cape Wrath to Duncansby Head, wild and sparsely populated. The other, seventy miles farther south, extends from Inverness eastwards into the North Sea and is graced by a chain of little seaport and agricultural towns with a self contained life of their own which makes London and the centres of power in the far south seem relatively unimportant.

Banff is one of the larger of these towns. Out to seaward there is nothing except the Shetlands in the way until the North Pole. To the south rises the massif of the Highlands, to a vhf man unpromising looking terrain. This has in no way deterred GM3UAG from pursuing activities on the 4m and 2m bands with a determined persistence which has won him an almost beacon-like reputation to operators many hundreds of miles away. He has developed almost a sixth sense where imminent aurora or tropo openings are concerned, and it is this ability to make best use of propagation knowledge which has won him his DX reputation.

What is it like to live near the auroral belt? And do visible manifestations of the Northern Lights always accompany Tone A on the vhf bands? It is the experience of GM3UAG that if he catches the start of an auroral opening then it is usually quite some time (2½ hours on that memorable opening of 23 March) before any contacts result. The lights themselves can help, he says. If there is just a faint glow, low down on the horizon, the chances of radio aurorae are good, but if a big display appears the radio aurora is by and large over.

This has been the pattern in all cases of radio and visible aurora recorded at Banff. Every time a radio aurora has occurred with clear skies a visible display has also been recorded.

Both GB3GM and SM4MPI are good indicators of aurorae: they go "Tone A" before anything else.

The best auroral 4m contact from GM3UAG to date is G3JVL down in Hampshire, and on 2m with GW3LJP and EI2A. Some good tropo DX has been worked on "Two" but none on "Four," which means that 'UAG has yet to work GM on the latter band.

Aside from the excitements of anomalous propagation, the general condition of the vhf bands along the Moray Firth may be epitomized as "quiet" by GM3UAG and the small group of stations along the Firth who regularly use them. Under normal propagation the Thurso beacon (QRB 70 miles from Banff) is logged in Summer at S5-7 on both 2m and 4m, and is sometimes audible when the northabout aerial at GB3GM is switched in. Its winter level is S2/3 on both bands.

On 4m considerations of TVI to Channel 4 television forbid the use of more than 20 watts input. The aerial is a 4-element Yagi at 20 feet. On 2m a 5-element Yagi accepts the output from an 829B running at 90 watts dc input—though a smaller transmitter with 20 watts to a 3/10 and kept for local contacts has excelled itself by raising GW3LJP and PA0FAS by aurora.

There are listening facilities for 6m and the satellite band, and for 70cm, with transmitting equipment for 432 MHz coming along.

First licensed in 1965, GM3UAG gives his main interest as construction and experimentation. He says: "I find vhf construction and propagation a very keen, stimulating challenge. World wide DX does not appeal, unless moon bounce! I still occasionally work 160 or 80m cw of an evening."

By profession a science teacher at Banff Academy, Jim Davidson is 29, married, and has two sons, Michael (4) and Alan (2).

Another contest with a 4m content: the BARTG VHF RTTY event organized by the British Amateur Radio Teleprinter Group for 24 hours over 13/14 September. There will also be operation on 70cm (with bonus plus-up of times 10) and on 144 MHz. A copy of the rules can be received from the BARTG Contests and Awards Manager, G8CDW, 33B Windmill Hill, Enfield, Middlesex, by sending him a long sae.

Proposed Mid-Scotland VHF Group

With activity on the metre wavebands developing steadily in the thickly populated Lowlands belt of Scotland, there have been suggestions to form a VHF Group in the area. To this end a meeting was planned for May and will probably have resulted by the time this piece appears in the inauguration of the Group.

Nothing but good can come from such a proposal; all interested will find it well worthwhile keeping in touch with GM3DXJ on this point (Tom Holbert, 19 Thomson Drive, Currie, Midlothian, EH14 5EY).

* * *

The next two meetings of the Leicestershire VHF/UHF Group take them away from their usual meeting place at the Leicester Polytechnic. On 19 June they visit the County Police Control Room, and on 17 July there will be a repeat of last year's social gathering, the Summer Supper at a rural retreat.

A Crystal Bureau?

The offer made in these columns by G2WS of his spare crystals to help people get in zone brought a flood of replies by letter and landline. " I was cleared out in a day or two," reports Bill Scarr.

The experience emphasized to him the need for a " crystal bureau " of some sort of another to be set up to accept crystals from members prepared to sell or exchange them, and to keep enquirers informed of what was available. If such a crystal bank were to be set up members could interrogate it for any particular frequency or type required.

We reckon that such a bureau could be quite comfortably operated by one or perhaps two retired members who had the time available to make a thoroughly organized job of it. Will any " PL " come forward and offer to start it up? Meanwhile, pending the happy day when one does we'll continue with " Xtal Xchange." Now read on.

Ian J. Kyle, GI8AYZ, has for disposal an HC-6 U crystal on 12005·76 kHz and would like to exchange it for one around 8100 kHz.

Look out specially for—

—GM3TLA/P operating from the rare county of Kincardineshire on both 2m and 4m from a 1400 ft site most Sunday mornings, and occasional weeknights. Write him for schedules if required.

—GD3XAC/P from the IOM, during 5–13 July, with cw and ssb on 4m, 2m and 70cm. Earlier tests from the Snaefell site using 15 mW to an OC170 pa on " Four " produced QSOs into Lancashire almost up to 100 miles.

—F0CK/M operated from the Calais coast cliffs by a Belgian group led by ON4PU and ON5LV . . . they will be on 2m looking for UK contacts during the 5 July contest.

—GW3XC/P holidaying 6–21 June in, first, Glamorganshire, then Carmarthenshire, Pembrokeshire, Cardigan, Merioneth and Anglesey. Operation is 8–10 pm clocktime on 144·149 and 144·308 MHz for A3, and on 144·032 and 144·1 MHz for cw.

—G3XC/P and G2BHW/P during *any* vhf/uhf contests. The Cornish Group participates in most of them. " Remember to turn beams towards Cornwall," exhorts G3LPB: " You may work these, plus a dozen or so others out on a limb in this beautiful county."

—GW3OBD/P, 28 July to 5 August from 1900 GMT most nights from various sites in Brecon. This is a specially worthwhile expedition: it will be wholly uhf on 70cm, 23 and 13cm, with 9cm and 3cm gear probably available. " Two " will be used only if uhf gives out. It would seem well worth while setting up a few skeds in advance with Phil Dutfield, 16 Talbot Drive, Poole, Dorset.

—GI8AYZ, operational most contests on " Two." He could in particular do with a few schedules with northern G stations from his home QTH, " Hillside," Galgorm Gardens, Ballymena.

Tech Corner

From GM3UWX (Jim Stirling, of Bishopston, Renfrew):

Perhaps my solution to the TVI problem will be of interest. Running 18 watts input and an 8-element beam at 42 feet, I had very serious trouble from sound breakthrough on TV, hi fi amplifiers and tape recorders all around. The GPO when called in pronounced the transmitter to be clean, but the TV sets were transistor jobs and did not yield to the usual treatment with stubs, filters and the like.

In view of the fact that I was clear on cw, I tried fm phone. The result was a complete cure of all my interference problems. To encourage everyone who hasn't tried fm because the books say an ordinary communications receiver doesn't resolve it very well, I should add that the nine stations regularly active in the Clyde Valley net read me without any trouble.

The method of achieving fm, for which I claim no originality, is to feed some af into the screen grid circuit of the EF80 crystal oscillator doubler via a small modulation transformer (Fig. 1). I find that 18 volts rms across terminals " X " produces an fm signal on 2m which occupies the same bandwidth as an am signal. The modulation power required is about 50 mW.

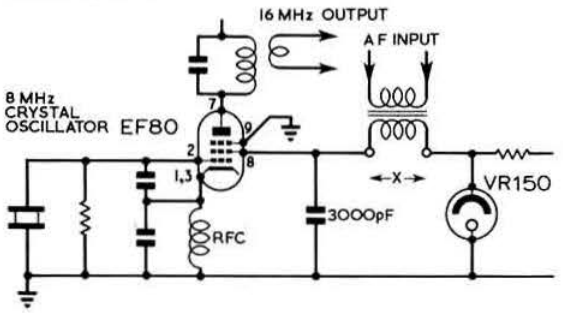


Fig 1.

From G8AZU (Brian Coleman, of Sunbury on Thames):

The use of solar cells as a power source in space satellites is well known, though their application to amateur radio equipment in the UK might seem to be somewhat uncertain in the heavily clouded climate. Nevertheless, it was thought

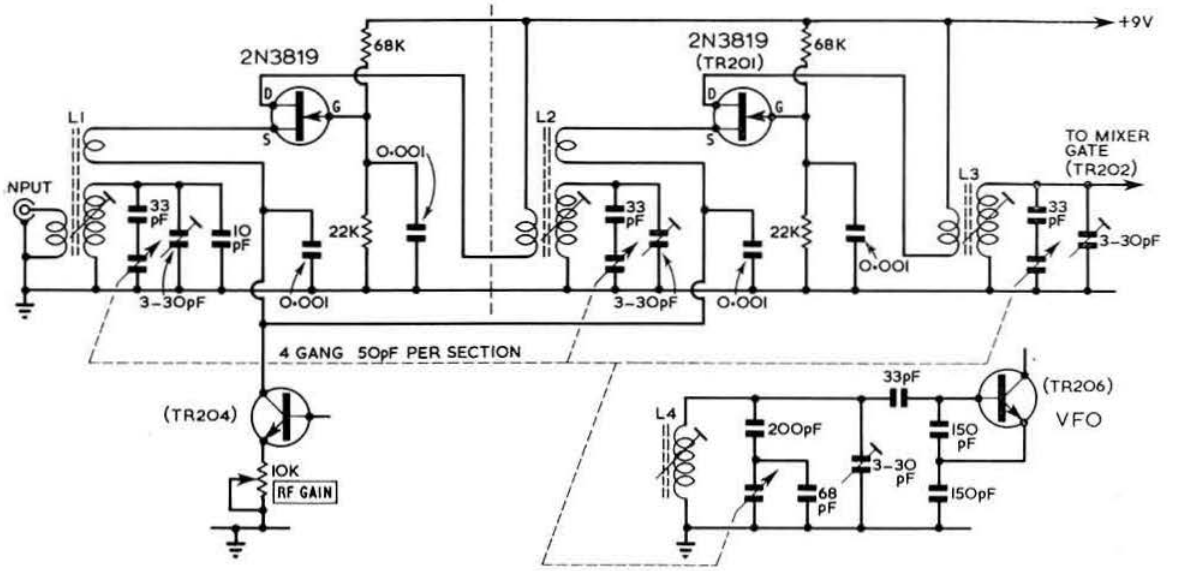


Fig 2.

worthwhile making up a bank of 54 solar cells each ¾ inch square, to see if these would satisfactorily power the QRP transistor transmitter at G8AZU.

In direct sunlight each of the cells provided 70–100 mA at 0·5 volt, and if the Sun happened to be strong enough the bank would furnish 300 mA at 9 volts. This proved to be enough to power the 2m transmitter and receiver, and several A3 contacts up and down the Thames Valley were made. The best contact was with G8BIS/P at a range of about 20 miles (S9 both ways).

Further cells will shortly be added to the bank to raise the output to 12 volts. The possibilities of solar cells as a reserve supply to take on portable expeditions, to be used when illumination is adequate, may encourage other members to experiment with them.

From G3NOH (George Eddowes of Watford):

The circuit shown at Fig. 2 is a modification of the tunable i.f. described by G3UJP in *Radio Communication* for November, 1968, enabling the design to be used with vhf converters. I have made the front end cover 14-16 MHz, which entailed only obtaining suitable coils and capacitors. Coil winding data are given in Fig. 3.

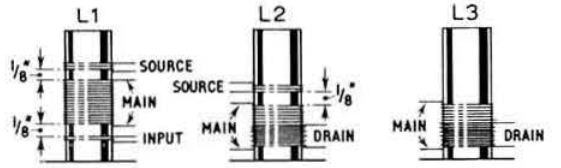


Fig 3. Coils for the G3NOH adaptation of the G3UJP tunable i.f. unit for use with a tuning range of 14-16 MHz when fed by a vhf converter. The first three inductors are close wound on ¼-in formers with slugs; the vfo inductor has 6 turns of 24 swg close wound on a ¼ in former.
L1, main winding, 12 turns 24 swg; source winding 3 turns 36 swg, input winding 2 turns 24 swg.
L2, main winding and source winding as L1, but drain winding 12 turns 38 swg over cold end of main winding.
L3, main winding 12 turns 24 swg, drain winding 12 turns 38 swg over cold end of main winding.

An extra rf stage has also been included to provide additional image rejection, and a manual rf gain control is included.

The tuning capacitor consists of two 2-gang units of 50pF value, such as those used in the RF26. As these capacitors do not have spindles at both ends it is necessary to extend them. I did this by tapping the flush end of the capacitor spindle 8BA so that the two could be united by means of a short length of 8BA studding. A short collar ¼ in inside diameter is slipped over the join and the whole lot soldered together. If the extension spindle, studding and collar are of brass soldering is made easier.

I would like to add that the G3UJP design appears to be most satisfactory and I would recommend it to the newest comer to transistor circuitry. I built the receiver on home made printed circuits and it worked first time.

Here and There

" Until the VHF Contests Committee realize that the 2m bandplan is a good idea only if operators stick to it, or are penalized if they deviate from it during a contest, will stations remotely situated like us in Cornwall have a chance of making a reasonable number of contacts. During the Fourth 144 MHz (Portable) Contest the lf end, cw included, was full of phone stations, most of them out of zone"—G3XC.

* * *

A few copies are available of " Quickstarter " converter articles, made for distribution at Convention. They are from *RSGB Bulletin*, Feb., 1964 (valve cascode) and April 1966 (transistor), and may be had from G5UM if a foolscap size sae is sent.

* * *

" A suggestion for the future: make the issue of *Radio Communication* following the Convention a VHF Number, publishing all the talks given there . . . next year perhaps? " —BRS3015 (George Carter of Pulborough).

SOCIETY AFFAIRS AND NEWS SUPPLEMENT

A regular visitor from Canada is Noel Eaton, VE3CJ, ARRL Canadian Director. This was Noel's first visit to Doughty Street, since our move last November. On the right of our picture is Roy Stevens, G2BVN, RSGB Council Member.

A brief report of the RSGB Council Meeting held on Friday, 25 April, 1969.

Present: The President: (Mr J. W. Swinnerton) in the chair, Messrs B. Armstrong, N. Caws, J. Etherington, J. C. Graham, R. J. Hughes, A. F. Hunter, G. R. Jessop, H. E. McNally, L. E. Newnham, R. F. Stevens, G. M. C. Stone, G. Twist, F. C. Ward, E. W. Yeomanson (Members of Council), A. E. Dowdeswell (General Manager), and J. Adey (Associate Editor).

Apologies for absence were received from Messrs J. Petty and E. G. Ingram.

Membership

Council resolved:

(i) to elect 168 Corporate members and 49 Associate members.

(ii) to grant Corporate membership to 15 Associates.

Council also resolved to waive the subscriptions of six members owing to blindness or other disability.

Affiliation

A number of applications for affiliation were approved. For further details see QTC, page 378.

IARU

Proposal No. 127 by IARU HQ that the Western Samoa ARC be admitted to membership of IARU received approval from Council.

Library

Council accepted with thanks the offer of a number of books from the estate of the late John Clarricoats, G6CL.

Members Ads

Council had received complaints from members regarding the misuse of the members' free advertising facility. Some advertisements were for items of little value, while others could be counted as trade advertisements. Council requested the editorial staff to see that this facility was not abused in the future, in view of the expense to the Society.

Space Conference

The present position was reported and the Society was in touch with the GPO. After the IARU Region 1 Conference had taken place a further approach would be made with a view to obtaining additional space communication facilities.

Committee Recommendations

The following Committee recommendations were approved by Council:

HF Contests Committee: that the Whitworth Trophy (28 MHz Transmitting) be awarded to Mr H. Perkins, G3NMH and the Metcalfe Trophy (28 MHz Receiving) be awarded to Mr J. Skidmore, BRS24631.

that the Thomas G6QB Memorial Trophy (7 MHz CW) be awarded to G. W. Spray, G3FXA.

that the Edgware Trophy (Affiliated Societies Contest) be awarded lo Maidstone YMCA Amateur Radio Society, G3TRF.

Minutes of Committees

The following Minutes were approved: HF Contests Committee (27.2.69); Finance & Staff Committee (10.3.69); GPO liaison & TVI Committee (11.3.69); Exhibition Committee (14.3.69); Education Committee (15.3.69); Membership & Representation Committee (17.3.69); Scientific Studies Committee (24.3.69); VHF Contests Committee (25.3.69); VHF Committee (26.3.69); Finance & Staff Committee (15.4.69); RAEN Committee (22.3.69).

Other Business

Council approved the appointment of Mr J. G. Swan, GM8BSE, as Deputy RR Region 14.

Mr Hunter stated that the Scottish Mobile Rally will be held at Aberdeen in late August or early September and that the Scottish VHF Convention would be held in Edinburgh in October.

After discussion, Council decided that representation on the BSI Committee on " Safety requirements for Radio & TV Receivers " was no longer needed.

Council was in session for 4½ hours.

Mobile Rallies

Roy Warrender, G8ASW, operating G3MAR/A at the North Midlands Mobile Rally.

North Midlands Mobile Rally

This year's event set the mobile rally season off to a good start by attracting about 2500 people to Drayton Manor Park in Staffordshire on 20 April, in addition to the thousands of Midlanders who normally throng the Park and pleasure grounds on a sunny Sunday afternoon.

The rally, organized by the Midland Amateur Radio Society, assisted by Stoke-on-Trent ARS, was under the chairmanship of Roy Day, G8ADV. It was opened at noon by MARS President Charlie Haycock, G3JDJ, and by mid-afternoon the two exhibition rooms were packed with visitors milling around the 40 or so stands buying everything from condensers of unspecified value to the latest marvels from the famous names in amateur radio.

The large "signing-in" board coupled with the "meet your friends" announcements on the public address proved very popular and by the close of the rally 620 call-signs plus 100 SWL's names had been entered in. It is interesting to note that about 80 of these had travelled over 100 miles (including G3UXN from Torquay and SWL Meachen from Scotland!)

The sustained success of this event is, no doubt, due in some measure to the attractions afforded to the oft-forgotten XYL's and juniors by the fun-fair, zoo, pleasure gardens and cafeterias in the Park.

The organizers would like to take this opportunity to thank all the exhibitors and visitors who came along and to welcome them all to the next North Midlands Mobile Rally at Drayton Manor Park, near Tamworth, Staffs on 19 April, 1970.

Colchester

The Colchester Amateur Radio Club will hold a mobile rally at Colchester Zoo on Sunday, 6 July. GB3ZOO will be in operation and further information can be obtained from G3VAG.

New Forest

A Mobile Picnic will be held on 13 July at Stoney Cross Airfield, near Cadnam in the New Forest. The organizers are the Wessex Amateur Radio Club and the talk-in stations will be G3FVU/P and G8AVE/P, on 1880 kHz and 144·2 MHz respectively.

Longleat

This well-known rally takes place this year on Sunday 29 June, at Longleat Park, near Warminster, Wilts., at the home of Lord Bath. There will be the usual trade exhibits, RSGB Bookstall, junk disposal and other side shows. Talk-in stations will be on 160 and 2 metres. Other attractions at Longleat include lions, apes and picturesque picnic areas. Overnight Saturday parking, by tent or caravan, can be arranged by prior consultation with G3JMY. The rally site is by the car exit of the lion reserve, besides the lake, on the main Frome to Warminster road.

South Shields

This rally will take place on 6 July at the Bents Park Recreation Ground, Coast Road, South Shields. Talk-in stations will be on 160 and 2 metres from 11 am and the rally events will commence at 1400. Light refreshments will be available. Intending visitors should note that it will be necessary to obtain free parking tickets prior to the weekend. These can be obtained from D. Foster, G3KZZ, 41 Marlborough Street, South Shields.

Obituaries

T. J. Evans, G2DFX

It is with regret that we must report the death of Jack Evans, G2DFX, on 23 April, from a heart attack, at the age of 64. Jack's cheery voice with a lilt from the Welsh valleys will be missed by all his friends. For many years, Jack was pharmacist at the small village of Eynsham. Our sympathy is offered to his widow. F.A.J.

R. Pearce, K5QWZ (G3XBV)

It is with great regret that we record the passing of "Bob" Pearce, K5QWZ of Oklahoma City, after a long illness. Bob settled down in Oklahoma City after a number of years in the Merchant Service. He was a graduate of the Liverpool University and the London Institute of Marine Engineering. He was a member of the "EX G club" also. Bob, very active on the HF bands, gave many a station their first Oklahoma contact. He was always at his happiest talking to his many G friends and had planned an early retirement in Liverpool to which end he had already obtained the call G3XBV. His enthusiasm and cheerful voice to which many had attached the nickname "The Liverpool Cowboy" will be sadly missed by many friends on the air. To his devoted wife Vera, his daughter Beryl and son Robert we extend our very deepest sympathy. H.J.

Your Opinion

Direction Finding

From: D. A. Evans, G3OUF, College of Air Training, Hamble, Southampton.

Just a note—the average amateur—may be confused by the caption on page 311 of the May *Radio Com*, Fig 7, top drawing, last line. . . .

There is no such thing as " magnetic declination "—he means to say " magnetic variation," but even this is not strictly true. Magnetic variation is the difference between " true " North and " Magnetic " North. The Ordnance survey maps are drawn on a grid. This grid does not align itself with either true North or Magnetic North. North on these maps is Grid North. The difference between Grid North and Magnetic North is called " Grivation." I can see a lot of lost fox hunters. . . .

The Author, Geoff Mills, G3EDM replies:

I cannot agree that there is " no such thing as magnetic declination." *I understand this to mean* the deviation (*in the horizontal plane*) *of the earth's magnetic field from true north and in my work on an Auroral map for the Scientific Studies committee no less an authority than the Royal Greenwich Observatory uses the term " declination."*

Your correspondent is perfectly correct in saying that the grid on the 1 in Ordnance Survey map is not aligned with either magnetic or true north and at the bottom of each 1 in Ordnance Survey map the differences are shown so I do not really see how a hunter could be confused. The hunter must, of course, be proficient in using a compass and in map reading otherwise he may never arrive home let alone find the hidden station! However, recently in the Vange Amateur Radio Society hunt G3VOP found the hidden station without either a map or a compass in the record time of 18 minutes. Needless to say he got there on a motorbike.

What has happened to all DX G's on the HF Bands?

From: John Allaway, G3FKM, 10 Knightlow Road, Birmingham 17.

In answer to G3WW's query concerning my contacts with HK0TU, no pep's were involved as all were on cw! Perhaps this was the instance which demonstrated the superiority of the mode for real DX working. My If aerial is a Telrex 40/80m inverted vee.

QRN?

From: T. Brook, G3WBQ, Leatherhead, Surrey.

Last November on damp or foggy evenings I experienced interference covering 30–200 MHz consisting of 100 Hz pulses found by oscilloscope test to be locked to the local mains. With the aid of 70 MHz mobile and walkie-talkie receivers I traced the source to a single phase 11 kV pylon on 20 ft wooden poles located 2·3 miles from my home. The offending insulator was also emitting an audible crackling sound.

I wrote to the District Manager of the local South Eastern Electricity Board giving details of the case and, by return, received a co-operative reply apologizing for any inconvenience and promising action to replace the faulty insulator. The inferference later ceased and I received a further letter expressing thanks for my trouble in localizing the source since " it is the type of fault which does not readily show itself on line patrol inspections." I have further been asked to pass on details of any similar faults that may occur in the future.

Other amateurs may find this case interesting and sufferers from pylon interference who are able to state a specific source might find a direct approach to the Electricity Authority would bring a helpful response.

RADIO AMATEUR EMERGENCY NETWORK

By S. W. LAW, G3PAZ*

NATURALLY you will always carry your Registration Card (stamped up to date!) in your wallet, in order that a police officer may know that you are not just another rubberneck at an incident. However, it has been pointed out that there is usually a certain urgency at these times and it is a great help to our User Services, the police in particular, if your car can be readily identified as a RAEN unit. May we therefore suggest that either a car badge or a windscreen sticker be attached in a prominent position at the front of the car. Both these items are obtainable from RSGB Headquarters at reasonable prices. Of course, you will take care that the stickers (which are self-adhesive) are so placed as not to obscure your vision, and that a car-badge is not allowed to become so mud spattered as to be unreadable.

Inter-County Liaison

Do you know your neighbours? It may well transpire that a big job might require the assistance of an adjoining Group, in which case it would be of the greatest help if the data were readily to hand. There are some very useful maps of the UK available from a well-known London firm which show only County boundaries and principal towns. These are known as Planning and Record Maps, the No 3 size being very handy for marking up the location, coverage, call-signs and the telephone numbers of other Controllers in surrounding areas. The cost of the map is under 5s. so Group funds will not be unduly strained. No doubt an enquiry at the local stationers will be fruitful and could work out cheaper than a direct order through the post.

RAEN Committee

In view of the amount of business in hand (despite the marathon session in March—which finished at 19·20 hr) a further meeting was held on 5 May. The matter of co-ordination of sections of the UK was discussed and the possibility of the appointment of officers with an overall responsibility for this purpose was explored. The intention is not to deprive individual Groups of any control within their own area but to promote closer liaison between Groups all over the country, particularly in view of the continued expansion of RAEN and the growing interest of the Authorities in our aims and capabilities. Much remains to be done, and it is no light task to find suitable people to take over the job of co-ordinating such an area as, for example, the Scottish Border down to Birmingham. The Committee is very sorry to have lost one of its most able members by the resignation of John Kingston, G3VK, for private and domestic reasons. The Committee have now to consider the question of a replacement, so if you have any ideas on the subject send them to the Honorary Secretary.

Manuals

Where RAEN Manuals have been ordered in the past by Controllers, these are now being forwarded. In view of the obvious cost of production, however, it would be very much appreciated if members who feel disposed to assist in taking the financial load off those who have freely given of their time and money would donate 2s 6d for their copy. This could well be done through the Group Controller who can then forward the sum to the Hon. Secretary, RAEN Committee. Thanks.

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* 11 Chisholm Road, Croydon, Surrey, CRO 6UQ.

Honorary Registrations Secretary:
Mrs. Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent.
Honorary Secretary, RAEN Committee:
Mr. E. R. L. Bassett, 57 Upper St. Helens Road, Hedge End, Southampton, SO3 4LG.

CONTEST NEWS

Second 70 MHz (Open) Contest, 1969

This contest on 13 April was very well supported, considering the very poor weather which appeared to prevail over most of the country and which no doubt had an adverse effect on propagation.

However, in spite of the weather, some very good scoring resulted.

In Section " A," congratulations go to G3VPK on a closely fought win over G3RLE who was " Breathing down his neck " only seven points behind, to take second place. Only a further few points behind G3RLE came G3TDH to be placed third.

Section " C " once again fell almost completely to the Welsh portables, but G3FDW/P from a nice site in Westmorland somewhat upset the Welsh camp by pushing into second place with only sixteen watts, and also gaining the record distance QSO for this contest in collaboration with G3GZJ at the other end.

Several contestants recorded their approval of the rules, but it still seems to be true that "One cannot please all of the people all of the time."

Comments from Contestants: " Rules OK for this event " (GW3NUE/P). " I consider the rules fair and comprehensive and simple in application " (G3FDW/P). " Where did all the southern portables get to ? " (G3PUO/P). " Horizontally polarized snow and sleet " (G3TDM/P). "Had to dig generator out of snow" (G3FDW/P). " Would prefer a 24 hour contest " (G3PUO/P). " Too many around 70·26 MHz." (GW3UZU/P). "Our score should ensure that we get the wooden spoon" (G3VKI/P). " Quite a relief not having to send QRA " (G2WS/P). " Let's have more short contests like this " (G3TDH). " RK34 valve for sale " (G3WQP). " We must have a contest out of TV hours " (G3OWA). " Very pleased about no QRA locator " (G3PMJ). " What has happened to all the twenty-four hour contests ?" (G3WMR). " Use of short circuited coax is not recommended " (G3YDY/P).

Thanks for check log received from G3LAS.

Section " A " Single operator, fixed stations
Section " B " Club, /A and Multi-op, fixed
Section " C " Portable Stations

Section "A", Single operator, fixed stations

Pos	Call	Score	County	QSOs	Best QSO	Height asl	Power	Aerial
1	G3VPK	207	EX	50	G3NJN/P	320 ft	50	4 ele
2	G3RLE	200	YS	43	G3JVL	500 ft	50	5 ele
3	G3TDH	186	BD	64	GW3OXD/P	520 ft	30	4 ele
4	G3NKL	164	LE	61	G3VPK	380 ft	50	4 ele
5	G6HD	153	KT	60	G3GZJ	67 ft	33	4 ele
6	G3EKP	148	LE	45	EI7AF/P	800 ft	20	4 ele
7	G3MEH	145	SY	70	G3RLE	—	50	4/4
8	G2AMV	142	CH	66	G3TDM/P	170 ft	45	4 ele
9	G3NEO	113	YS	23	G3VPF/P	380 ft	30	5 ele
10	G3VSA	97	LE	45	G5NU	180 ft	50	5 ele
11	G3GZJ	96	CL	9	G3FDW/P	800 ft	50	4 ele
12	G3HBG	79	SY	43	GW3NUE/P	400 ft	30	4 ele
	GI3WEM	79	Armagh	34	G3EKP	200 ft	45	2 × 4
13	G3WQP	75	LE	35	G3LAS	8 ft	18	4 ele
14	G3OWA	71	SY	30	GW3NUE/P	530 ft	15	4 ele
15	G3PMJ	60	LE	24	GW3NUE/P	250 ft	50	5 ele
16	G3OHC	57	WK	14	G3FDW/P	520 ft	10	4 ele
17	G3WMR	52	LD	42	G5HZ/P	200 ft	12	Dipole
18	G3UFP	51	HF	26	G5RCV/P	250	15	4 ele
19	G3XVU	32	YS	16	G3FDW/P	600	8	4 ele
20	G3WWF	29	YS	18	G3FDW/P	200	8	Bi-Sq Indoor
21	G3XKZ	24	WK	8	GW3NUE/P	229	6	3 ele
22	G3UOV	12	SX	9	G3GVM	230	7	3 ele

G3OHH, Disqualified, (Rule 17 and Rule 4a)

Section "B", Club, /A and Multi-op fixed

Pos	Call	Score	County	QSOs	Best QSO	Height asl	Power	Aerial
1	G3VFD/A	109	LD	63	GW3OXD/P	50	15	4 ele
2	G3THQ/A	98	MX	62	GW3NUE/P	150	23	4 ele
3	G3YDD/A	62	HD	18	G5HZ/P	250	8	4 ele
4	GM3KSU/A	18	MN	7	G3FDW/P	325	10	3 ele

G3SLJ/A Disqualified, (Rule 11, poor quality signal)

Section "C", Portable Stations

Pos	Call	Score	County	QSOs	Best QSO	Height asl	Power watts	Aerial
1	GW3NUE/P	522	BR	81	G3FDW/P	2600	50	4 ele
2	G3FDW/P	419	WD	60	G3GZJ	2780	16	4 ele
3	GW3ODX/P	389	RN	68	G3VPK	1950	35	4 ele
4	GW3UCB/P	354	CV	67	G3GZJ	2529	15	6/6 Slot
5	G3PUO/P	246	YS	64	G3JHM/A	1272	40	4 ele
6	G3VPS/P	236	SX	76	GW3NUE/P	659	25	4/4
7	G3RCV/P	234	SX	83	G3OHH	813	20	4/4
8	G5HZ/P	223	HE	54	G3FDW/P	779	12	4 ele
9	G3TDM/P	178	BD	60	G2AMV	798	15	4 ele
10	G3WCB/P	132	OX	41	G3NEO	647	20	4 ele
11	GW3UZU/P	130	FT	48	G3PUO/P	1000	8	4 ele
12	G3VXK/P	104	LE	58	EI7AF/P	500	15	4 ele
13	G3VKI/P	50	SY	30	G3VPF/P	860	20	3 ele
14	G2WS/P	35	ST	11	GW3UCB/P	800	8/10	4 ele
15	G3WKF/P	27	CL	6	GW3NUE/P	600	25	4/4
16	G3YDY/P	15	EX	15	G3WSC	387	10	3 ele
17	G3JKY/P	5	SX	5	G3TTG/P	760	1	¼ Wave whip

D/F Qualifying Event—Oxford

Date: 29 June, 1969.

Map: Ordnance Survey Sheet 145 (Banbury).

Assembly: 1300 BST for start at 1320 BST.

Location: Approximately 2 miles NE of Woodstock on B4027, between A423(T) and A4095. NGR 469 194.

Organizer: R. J. Pearce-Boby, G3JLE, 63 Bartlemas Road, Oxford. OX4 1XU.

Frequencies and Call Signs: To be announced at start.

Entries and Tea: Intending competitors are asked to notify the organizer by 22 June if taking part, stating the number of teas required.

Salisbury D/F Qualifying Event

When: Sunday, 20 July, 1969.

Map: Ordnance Survey, sheet 167, Salisbury.

Assembly: 13.00 BST.

Location: Eyre's Folly (locally known as "Pepperbox Hill"), NGR 213248.

Frequencies and Call Signs: to be announced at the start.

Organizers: Sir Evan Y. Nepean, Bt, G5YN, and Sqn Ldr D. E. C. Lockyer, G3HCL, 11 Merrifield Road, Ford, Salisbury, Wilts.

Entries and tea: Intending competitors please notify the organizers before 1 July, stating the number in their party requiring tea.

Rules for the RSGB 7 MHz DX Contest 1969

Radio Amateurs throughout the world are invited to take part in the eighth RSGB 7 MHz DX Contest for single operator stations.

1. The General Rules for RSGB HF Contests, published in the January 1969 edition of *Radio Communication*, will apply.

2. When: CW Section: 18.00 GMT on Saturday, 25 October to 18.00 GMT on Sunday, 26 October, 1969,

Phone Section: 18.00 GMT on Saturday, 8 November to 18.00 GMT on Sunday, 9 November, 1969.

3. Eligible Entrants: licensed amateurs in all parts of the world. British Isles entrants must be members of the RSGB.

4. Contacts: CW Section: CW (A1) only.
Phone Section: AM or SSB.

Serial numbers must start at 001 for each section.

5. Scoring: British Isles stations may not work each other for points. Overseas stations may only claim points for contacts with British Isles stations (G, GC, GD, GI, GM, GW).

Each contact between a British Isles station and an overseas station will score as follows:

Location of overseas station	Points
Continent of Europe	5
Continent of North America	15
Continent of South America	25
Continent of Asia	25
Continent of Africa	25
Continent of Oceania	50

Bonus Points: British Isles stations may claim a bonus of 20 points for the first contact with each new country. For the purposes of scoring, the "RSGB Countries List" will apply, with the exception that VE, VK, W/K, ZL, and ZS call areas will each count as separate countries.

Overseas stations may claim a bonus of 50 points for the first contact with each British Isles country-numeral prefix, ie. G2, G3, G4, G5, G6, G8, GC2, GC3, GC4, GC5, GC6, GC8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GM2, GM3, GM4, GM5, GM6, GM8, GW2, GW3, GW4, GW5, GW6, GW8. Contacts with GB stations will not score bonus points.

6. Entries: must be addressed to the RSGB HF Contests Committee, c/o R. S. Biggs, G2FLG, 29 Lord Avenue, Clayhall, Ilford, Essex, England.

7. Trophy: the Thomas (G6QB) Memorial Trophy will be awarded to the leading British Isles entrant in the CW section.

Copies of the General Rules for RSGB HF Contests, as well as Contest Log Sheets and Cover Sheets, may be obtained upon request from The General Manager, Radio Society of Great Britain, 35 Doughty Street, London, WC1, England. Whenever possible, a large sae should accompany your request.

Listeners' Section

The HF Contests Committee notes with concern the decrease in the number of entries for the Listeners' Contests in recent years. Unless an improvement is evident for this year's contest, consideration will be given to withdrawing the events.

1. Duration: Each section of the Contest will take place between 18.00 GMT on the Saturday and 18.00 GMT on the Sunday as follows:

C.W.: 25–26 October, 1969. **Phone:** 8–9 November, 1969.

2. Eligible Entrants: The contest is open to short-wave listeners throughout the world. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the event—holders of amateur transmitting licences are not eligible to take part.

3. Entries: Entries (*a*) should be clearly typed or written on one side only of foolscap or International A4 size paper; (*b*) must be ruled in columns headed (in this order) (i) Date/Time GMT; (ii) Call-sign of station heard; (iii) Report and serial number sent by station heard; (iv) Call-sign of station being worked; (v) Bonus points; (vi) Total points claimed; (c) must be addressed to the **HF Contests Committee, Radio Society of Great Britain, 35 Doughty Street, London, WC1, England.** The name of the Contest must be clearly shown on the top left hand corner of the envelope, which must be postmarked not later than 24 November, 1969. Log sheets are available from RSGB Headquarters. All entries must contain the following declaration:

I declare that this receiving station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the RSGB shall be final in all cases of dispute. I do not hold an amateur transmitting licence.

Date ..... Signature .....

4. Scoring: British Isles entrants may only log overseas stations working UK stations in the contest. Overseas entrants may only log British Isles stations in contact with overseas stations in the contest. A station whether fixed, portable, mobile or alternative address may be logged only once for the purpose of scoring. *CQ or test calls will not count for points.*

For British Isles entrants, each completed log entry of a contact between a British Isles station and a station in the following continents will score as indicated:

Continent of Europe	5 points
Continent of North America	15 points
Continents of South America, Africa and Asia ...	25 points
Continent of Oceania	50 points

For overseas entrants, each completed log entry of a contact between the British Isles station and any other station in the contest will score as indicated:

Where the listener is in continent of Europe	5 points
Continent of North America	15 points
Continents of South America, Africa and Asia ...	25 points
Continent of Oceania	50 points

5. The Committee reserves the right to disqualify any entrant whose log is consistently inaccurate.

Bonus Points:

British Isles Entrants: A bonus of 20 points may be claimed for the first station logged in each new country. For the purpose of scoring the **RSGB Countries List** will apply, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas Entrants: A bonus of 50 points may be claimed for the first station logged in each British Isles country—numerical prefix, i.e. G2, G3, GM4, etc., as listed in Rule 6 for the Transmitting Contest.

6. Awards: A certificate of merit will be awarded to the leading entrant in each of the British Isles countries and to the three leading overseas entrants.

July 1969 144 MHz Open Contest

1. Date and Time: From 1600 GMT on 5 July to 1400 GMT on 6 July.

2. All **Entries** and check **logs** must be sent to the Adjudicator at: VHF Contests Committee, c/o G3JKY, 60 Merlin Grove, Beckenham, Kent BR3 3HU.

In addition, the following **General Rules** as published in the January issue of *Radio Communication* will apply: 3a, 4a 5a, 6a, 7a, 8a, 9a, 10a, and 11-28.

Listeners' 144 MHz Contest

Non-licensed members of the RSGB are invited to take part in this contest which will be held between 1600 GMT on 5 July and 1400 GMT on 6 July to co-incide with the 144 MHz Open Contest. The rules for the 1969 VHF-UHF Listeners Championship, published in the January issue, will apply. At the discretion of Council, Certificates of Merit will be awarded to the winner and runner-up. Entries will automatically be credited to the Championship.

CONTEST NEWS

Stratford-upon-Avon D/F Qualifying Event

Seventeen teams assembled on Broadway Hill for the start of the first qualifying event of 1969, and the organizers thank those who travelled long distances, to attend. The contest was designed to make competitors walk long distances, to offset the lack of dense foliage in the Vale of Evesham in April.

Transmitter A, G3RPJ/P, was nine miles away on Bredon Hill, a large flat-topped hill with ample opportunity for approaching from the wrong direction. A local farmer had kindly offered to transport the transmitter crew to the top in his Land Rover, but competitors were unable to get so close in their cars and many arrived at the transmitter completely exhausted after a steep uphill climb of over a mile.

Transmitter B, G3ORI/P was near Evesham, seven miles from the start. The site appeared on the map as an island in the river Avon, but was in fact bounded on one side by a marshy inlet resembling a mangrove swamp. An underground pipeline made bearings in the vicinity very unreliable. As had been intended, some competitors found themselves on the wrong side of the river, but one managed to hitch a lift on a passing boat. Subject to official confirmation, Messrs. Pearce-Boby, Gee and Hawkins qualify for the National Final. Mr Pearce-Boby was using the receiver recently described in *Radio Communication* and is to be congratulated on a convincing victory. The complete results are given below.

There was an amusing sequel to the contest, which has a moral. Mr Butson inadvertently left his receiver by the roadside at Evesham, and within a few hours it had been handed in at the local police station. The constabulary were uncertain whether it was the property of an industrial spy, an international spy, or the Free Wales Army, but they were taking no chances. The set was finally declared harmless by a BBC engineer at the nearby Wood Norton training establishment.

Pos	Competitor	Club	Time of Arrival Transmitter A	Transmitter B
1	R. J. Pearce-Boby	Oxford	1429	1503
2	M. J. Gee	Oxford	1429½	1525
3	M. P. Hawkins	Oxford	1459	1530
4	P. T. Tyler	Oxford	1440	1537
5	I. R. Butson	Oxford	1430	1542
6	W. J. North	Chiltern	1459½	1603
7	T. C. Gage	Oxford	1525	1614
8	B. M. Bristow	Chiltern	1616	1532
9	R. Curnow	Oxford	1629	1531
10	E. L. Mollart	Oxford	1629½	1536½
11	D. E. Newman	Rugby	1512	—
12	E. W. Bristow	Oxford	1513	—
13	A. Simmons	Oxford	1525½	—
14	O. L. Harding	Rugby	—	1530½
15	B. J. Mahony	Rugby	—	1538

(Two competitors failed to locate either transmitter).

July 1969 432 MHz Portable Contest

1. Date and Time: 1000 GMT to 1600 GMT on 20 July.

2. All **entries** and check **logs** must be sent to the Adjudicator at: VHF Contests Committee, c/o G2HIF 20 Harcourt Road, Wantage, Berks.

3. In addition, the following General Rules as published in the January issue of *Radio Communication* will apply: 3b, 4a, 5a, 6a, 7c, 8a, 9a, 10a, 11-19 and 25-28.

Looking Ahead

13-14 September—IARC Convention, Geneva.

1-4 October—RSGB International Radio Engineering and Communications Exhibition, Royal Horticultural Society's New Hall, Greycoat Street, Westminster, SW1. 10 am to 9 pm.

Contest Diary

7-8 June—National Field Day (page 131, February).

22 June—D/F Hunt in the beautiful Gower National Park. Further details from Secretary, D. West, GW3TYI, Nevadd Gilbertson, Clyne, Abertawe, Morgannwg, or listen to GB2RS transmissions.

22 June—June 1969 70 MHz portable contest (page 349, May).

29 June—Oxford D/F Qualifying Event (page 420, June).

5-6 July—Summer 1·8 MHz Contest (page 350, May).

5-6 July—July 1969 144 MHz Open Contest (page 421, June).

5-6 July—Listeners 144 MHz Contest.

12-13 July—High Power Field Day (page 203, March).

20 July—Salisbury D/F Qualifying Event (page 420, June).

20 July—July 1969 432 MHz Portable Contest (see this prge).

3 August—High Wycombe D/F Qualifying Event.

4 August—August 1969 144 MHz SSB Contest.

10 August—August 1969 432 MHz Open Contest.

17 August—August 1969 70 MHz CW Contest.

6-7 September—VHF National Field Day.*

14 September—3·5 MHz Field Day.

21 September—Rugby D/F National Final.

21 September—September 1969 144 MHz Fixed Station Contest.

5 October—October 1969 1296 MHz Open Contest.

11-12 October—28 MHz Telephony Contest (page 350, May).

25-26 October—7 MHz Contest (CW) (page 421, June).

3 November—November 1969 144 MHz SSB Contest.

8-9 November—7 MHz Contest (Phone) (page 421, June).

15-16 November—Second 1·8 MHz Contest.

6-7 December—Tops CW Club 80m Contest.

7 December—December 1969 70 MHz CW Contest.

* To coincide with an IARU Region 1 Contest.

Mobile Rallies

29 June—Longleat Mobile Rally, Longleat Park, near Warminster, Wilts. Organized by the Bristol RSGB Group, assisted by the Bristol ARC.

6 July—South Shields Mobile Rally.

13 July—Worcester Mobile Rally.

27 July—Cornish Radio Amateur Club, provisional location—The County Scout Headquarters, Malpas Truro.

27 July—The White Rose Mobile Rally, Allerton High School, Leeds.

10 August—RSGB National Mobile Rally, Woburn Abbey.

17 August—Derby and District Mobile Rally.

24 August—Torbay ARS Mobile Rally.

24 August—ARMS/RSARS Rally, Blandford Camp, Dorset. ARMS/RSARS Members only.

24 August—Swindon Mobile Rally organized by the Swindon and District Amateur Radio Society.

31 August—Bromsgrove and District ARC Mobile Picnic. Call G3VGG.

31 August—Preston Amateur Radio Society, Kimberley Barracks, Deepdale Road Preston.

28 September—Harlow Mobile Rally, Magdalen Laver Village Hall, near Harlow, east of the A11. Open from 10 am. Talk-in station on 160, 4 and 2m. Details from B. G. King, G8CHC. Harlow 20812.

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

These Slow Morse Practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the Honorary Organizer, M. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock Time		Call-sign	MHz	Town
Sundays				
09.30	..	†G3KZZ / G3TNF	1·920	South Shields, Co. Durham / Gateshead
09.30	..	G3HZL	1·940	Isleworth, Middlesex
09.45	..	G3USK	1·975	Mablethorpe, Lincs.
10.00	..	G2FXA	437·000 to North	Stockton-on-Tees
10.00	..	G3TTK	1·860	Coalville, Leics.
10.00	..	GM3PIP	3·590	Mintlaw, Aberdeen
10.15	..	G3CGD	1·875	Cheltenham
10.30	..	G3SJE	28·100	Harrow, Middlx.
10.30	..	G2FXA	437·000 to South	Stockton-on-Tees
10.30	..	G3NPB	1·875	St. Ives, Cornwall
11.00	..	G2FXA	1·900	Stockton-on-Tees
11.00	..	GW3UMB	1·880	Colwyn Bay
11.30	..	G3KKU	1·940	Liverpool
12.00	..	G3HVI	1·890	Stoke-on-Trent
12.00	..	G3GNS	1·910	Weston-super-Mare
12.30	..	G3FWW	1·880	Burnham-on-Sea, Soms.
13.30	..	G3XDV	1·910	Canterbury, Kent
14.00	..	G3XGJ	1·830	Huddersfield, Yorks.
17.30	..	G3TNF	1·920	Gateshead
Mondays				
17.30	..	G3TNF	1·920	Gateshead
18.00	..	G3SWR	1·980	Birmingham
18·30	..	G3NCZ	1·920	Blackburn, Lancs.
18.30	..	G3RXH	1·910	Skipton, Yorks.
19.00	..	G3WGU	1·880	Bispham, Lancs.
19.00	..	†GC4LI / GC2FMV	3·600	Jersey, C.I.
19.00	..	G3YJA	1·920	Coventry, Warks.
20.00	..	G3KAN	1·990	Northampton
20.00	..	G3IBJ	1·910	Southampton, Hants.
20.00	..	GI3JEX	1·860	Belfast
20.00	..	†G3WDW / G3VTY	1·915	Leeds, Yorks.
20.15	..	G3SAZ	1·845	Ashford, Middlesex
20.30	..	G3YEB	1·915	Harlow, Essex
† Alternately				
Tuesdays				
17·30	..	G3TNF	1·920	Gateshead
18.00	..	G3XDV	1·910	Canterbury, Kent
19.00	..	†G3UFO / G3XAM	1·980	Wirral, Cheshire
19.30	..	G3SWP	1·850	Doncaster, Yorks.
19.30	..	G3WGU	433·500 to South-East	Bispham, Lancs.
20.00	..	G3UPA	1·850	Meriden, Warks.
20.00	..	†G3FAU / G3KSS / G3OVT	1·980	Stevenage, Herts.
20.00	..	G3FWW	1·880	Burnham-on-Sea, Soms.
20.00	..	G3TPV	1·910	Hythe, Hants.
20.00	..	GM3UWX	144·045	Bishopton, Renfrewshire
20.30	..	G3UNV	1·845	Ashford, Middlx.
20.30	..	G2ABC	1·915	Woodford, Essex
21.00	..	G4RS	1·865	Blandford, Dorset
21.30	..	G2ABC	144·750	Woodford, Essex
22.00	..	G3HZM	1·925	Manchester

Wednesdays

17.30	..	G3TNF	1·920	Gateshead
18.30	..	G2FXA	1·900	Stockton-on-Tees
19.00	..	G3HT	1·930	Tiptree, Essex
19.30	..	G3WGU	433·500 to South-East	Bispham, Lancs.
19.30	..	G3UJD	1·825	Farnborough, Hants.
20.00	..	G8QU	1·970	London, N22
20.00	..	GM3PIP	3·590	Mintlaw, Aberdeen
20.30	..	G3HZL	1·845	Isleworth, Middlx.
20.30	..	G3KGU	1·915	Theydon Bois, Essex
21.00	..	G3HVI	1·890	Stoke-on-Trent
21.00	..	G3LQI	1·990	Lancing, Sussex

† Alternately

Thursdays

17.30	..	G3TNF	1·920	Gateshead
18.00	..	G3SWR	1·980	Birmingham
18.30	..	GW3VBP	3·590	Barry, Glam.
18.30	..	GW3UMB	1·880	Colwyn Bay
18.30	..	G3NC	1·968	Swindon, Wilts.
19.00	..	G3WGU	1·880	Bispham, Lancs.
19.30	..	G3GNS	1·910	Weston-super-Mare
20.00	..	GI3JEX	1·860	Belfast
20.30	..	G3SJE	1·875	Harrow, Middlx.
20.30	..	†G3ROE / G3RSF / G3TIQ	1·915	Harlow, Essex
21.00	..	G4RS	1·865	Blandford, Dorset
21.00	..	GW3XNI	1·930	Crosskeys, Mon.

Fridays

17.30	..	G3TNF	1·920	Gateshead
18.00	..	G3XDV	1·910	Canterbury, Kent
18.30	..	G3NCZ	1·920	Blackburn, Lancs.
19.00	..	G3NPB	1·875	St Ives, Cornwall
19.30	..	G3PQF	1·825	Farnborough, Hants.
20.00	..	†G3WGW / G3WIX	1·915	Pudsey, Yorks. / Bradford, Yorks.
20.00	..	G3EEL	1·980	Peterborough
20.15	..	G3SAZ	1·845	Ashford, Middlesex

Saturdays

09·30	..	G3UNV	1·940	Ashford, Middlesex
10.00	..	G3PLE	1·820	Stourbridge, Worcs.
13·00	..	G2FXA	1·900	Stockton-on-Tees
14.00	..	†GC4LI / GC2FMV	3·600	Jersey, C.I.
17.30	..	G3TNF	1·980	Gateshead
17.30	..	G3EFS	1·913	Bromley, Kent
20.00	..	G3KPO	1·980	Peterborough
20.00	..	G3WPR	1·915	Ilford, Essex
21.00	..	G3TTK	1·823	Coalville, Leics.

† Alternately

Members might like to be reminded that the Royal Naval Amateur Radio Society using their call-sign G3BZU, transmits c.w. as a proficiency test at 19.00 GMT on the first Tuesday of each month. Frequencies used are 1·875 MHz for practice only, and 3·520 MHz for speed proficiency tests. Certificates are issued against correct copy submitted to: The Royal Naval Amateur Radio Society, HMS Mercury, Leydene, Hants. A small charge is made to cover costs.

Listeners: These slow Morse practice transmissions are promoted specifically to help you, and unless you play your part it will become increasingly difficult to keep the service going. If you benefit from any of these transmissions you owe it to the operator concerned to let him know you listen. This service is a call upon the operator's leisure time, and he is more likely to sacrifice it to help you, if he knows he has an audience.

CLUB NEWS

Please send all information direct to Regional Representatives, giving full details of future meetings, and any snippets of activities which would be interesting in print. When listing meetings please be sure to include the date and time, the meeting place, the lecturer's full name and the call-sign to whom prospective members can refer. The last day on which Regional Representatives can accept letters for inclusion is the first of the previous month.

Region 1 RR B. O'Brien, G2AMV.

Merseyside Luncheon Club—Meets on the first Monday in every month. HMS Landfall. 12.30 for 12.45 meal. If you wish to attend please advise G3VQT or G2AMV beforehand.
Ainsdale (ARC)—11, 25 June, 9 July, 8 pm, "Morris Dancers," Scarisbrick.
Allerton (Liverpool)—Scout Amateur Radio Society, North West Region—First and third Thursdays each month, 8 pm, Liverpool County Scout Headquarters, Richmond Street, Liverpool.
Blackburn—East Lancashire Amateur Radio Club—5 June (Demonstration—Video Tape Recording by John Will G3OTA), 3 July (Open Night). 7.30 pm, Edinburgh House, Shearbank Road, Blackburn. Further details from G4JS.
Blackpool (B & FARS)—Mondays, 8 pm, Pontins Holiday Camp, Squires Gate. Morse tuition from 7.30 pm.
Bury (B & RRS)—10 June, 8 July, 8 pm, George Hotel (Private Room), Market Street, Bury. Club Secretary,G3VVQ, 411 Holcombe Road, Greenmount, Bury.
Cheshire (Mid-Cheshire ARC)—Club nights every Wednesday, 7 pm to 9.30 pm. Instruction nights every Thursday, 7 pm to 9.00 pm. The latter includes theoretical work for the RAE exam, practical construction and morse practice. Further details from G3JWK. Technical Activities Centre, Winsford Verdin Grammar School, Winsford, Cheshire.
Chester (C & DARS)—Tuesdays, 8 pm, YMCA, 23 May (Annual Dinner at the Oaklands Hotel).
Crewe & District—No meeting will be held for the time being as no accommodation is available. However, the Area Representative Mr. R. Owen of 10 Circle Avenue, Willaston, Nantwich, will welcome visitors at his home.
Douglas (D & DARS)—2nd and 4th Wednesdays each month, 7 pm, 19 Rosemount, Douglas. 11 June (Film), 25 June (to be announced), further information from W. T. McEvoy, 19 Rosemount, Douglas. Tel. Douglas 6146.
Eccles (E & DRC)—Tuesdays, 8 pm, Bridgewater School, Worsley, Lancs. Every Thursday, Club Top Band net 20.30 hours.
Leyland Hundred Amateur Radio Group—The Thursday night net at 20.00 hours GMT on 1·915 Mhz.
Liverpool (L & DARS)—Tuesdays, 8 pm, Conservative Association Rooms, Church Road, Wavertree. Secretary—H. James, G3MCN, 448 East Prescot Road, Knotty Ash, Liverpool 14.
Liverpool (NLRC)—6 and 20 June, 4 July, 8 pm. Landsbury House, 13 Crosby Road South, Liverpool 22. Secretary, R. Simmons, G3PNS, 62 Daneville Road, Liverpool L4 2RG.
Macclesfield (M & DRS)—17 June, 1 July, 8 pm, The George Hotel, Jordangate.
Manchester (M & DARS)—Wednesdays, 7.30 pm. 203 Droylsden Road, Newton Heath, Manchester 10. Hon. Secretary, G. Tillson, G3TJX, 95 Kelverlow Street, Oldham, Lancs.
Manchester (SMRC)—Fridays, 8 pm. Conservative Association Divisional Office, 449 Palatine Road, Northenden, Manchester 22.
North West VHF Group—Please note new address. Meetings will take place every Monday at 8 pm in the Club Caravan, Greeba, Shady Lane, Manchester 23.
Preston (PARS)—12 and 26 June, 10 July, 7.30 pm. (Private Room), "Windsor Castle", St. Paul's Square.
St. Helens (SES)—Meetings temporarily discontinued. Local enthusiasts should keep in touch with B. Hardy, 198 Knowsley Road, St. Helens, Lancs.
Salford (Dial House Radio Society)—Wednesday evenings at Dial House (1st Floor), Chapel Street, Salford 3. All members of the Society are GPO engineers. Anyone interested should contact the Club Secretary at the address given above.
Southport (SRS)—Wednesdays 8 pm and Sundays 2.30 pm. The Esplanade. Secretary, S. Miller, 72 Station Road, Banks, Southport.
Southport (73 SSB Society)—Thursdays at 8 pm. (All commencing with a talk on part of RAE Syllabus), 73 Avondale Road North, Southport.
Stockport (SRS)—11 and 25 June, 9 July, 8 pm. Please note new address for meetings—The Brookfield Hotel, Wellington Road South, Stockport. New members are always welcome. Further details from the new secretary who is D. I. Lunn, G3LSL, 4 Farnham Avenue, Macclesfield. (Tel. 7903).
Warrington, Culcheth (CARC)—Fridays, 7.30 pm. Chat Moss Hotel, Glazebury. All visitors will be welcome. Secretary—K. Bulgess, 32 Hendon Street, Leigh.
Westmorland—Fridays, 7.30 pm. 24 Park Road, Milnthorpe. Additionally there is an RAE class on Mondays and Thursdays at the same time. Secretary, G3UEC, 9 Castle View, Sedgwick, Kendal.
Wirral (WARS)—1st and 3rd Wednesday each month, 8 pm, at former Civil Defence HQ, Upton Road, Bidston, Birkenhead. Coming events: 4 June (Preparation for NFD), 7–8 June (NFD), 18 June (NFD Post Mortem), 22 June (Third 70 MHz (Portable) Contest), 29 June (Region 1 VHF Field Day), 2 July (The INOUE Transceiver by G3KEN). On April 2, G2AMV conducted a sale of surplus equipment. On 16 April an open evening took place in view of a need to change the lecture programme. Construction of furniture etc. for the headquarters building has been started together with maintenance of all field day gear including masts, guys and the generator set. We have quite a month ahead and we look forward to meeting visitors at all future functions.
Region 1 VHF Contest—please note date, 29 June. Full particulars may be obtained from G2CUZ or G2AMV.

Region 2 RR K. Skethaway, BRS20185

Barnsley (B & DARC)—13 June (" Fault finding in Receivers " by G3DHU), 27 June (Ladies Night), 7.30 pm, King George Hotel, Peel Street, Barnsley. *G3LRP.*
Bradford (BRS)—7-8 June (NFD Contest), 17 June (NFD Inquest), 7.30 pm, Bradford Technical College, Great Horton Road, Bradford. *G3HJP.*
Hartlepools (HARC)—Meetings every Monday at 7.30 pm, rear of 42, Murray Street, Hartlepool. Re-election of Officers: Lady Chairman—G3XWE (Gladys), Secretary and Treasurer—G3NWU (John). 19 May was on Panoramic Reception and future items include Exams and how to prepare for them by G3BRE and Amateur TV by G6ACI/T. Old and new members welcome. *G3NWU/G6ACI/T.*
Hull (H & DARS)—6 June (National Field Day arrangements), 13 June (" Transistor Power Supply Units " by G3PQY), 20 June (National Field Day post mortem), 27 June (" Mobile Equipment " by G3SSA), 7.45 pm, Unity Hall, 592, Hessle Road, Hull.

Our member—G3VXN—Radio Officer of the MV " Dalewood " which trades between the Thames and North East Coast Ports, is hoping soon to obtain a /MM licence, when he will eventually be active on all permitted bands up to 2 metres. *G3LNH.*
Middlesbrough (TARS)—1st & 3rd Fridays each month, 8 pm, Settlement House, 132 Newport Road, Middlesbrough. *G3JMO.*
Northern Heights—7–8 June (NFD), 11 June (Visit to Manchester Radio Club), 14 June (Demonstration Station at Halifax Charity Gala), Meetings 7.45 pm, Sportsman Inn, Ogden, Near Halifax. *G3MDW.*
Pudsey (P & DRC)—Address of Secretary is P. A. Conway, G3XLV, 719 Scott Hall Road, Leeds 17, and he is always pleased to hear from any prospective new members. The Club is very active at present with the usual lectures, constructional and operating

evenings, and RAE. A lot of work is being done by the members for the Rally on 17 July. It is the first Rally that we have organized and we are determined that it will be a success.

New members are always welcome at the Club, meetings are held every Wednesday night at approx. 7.30 pm, Bramley Liberal Club, Hough Lane, Bramley, Leeds 13. *G3WIX.*

Scarborough (SARS)—7.30 pm, Thursdays, c/o RAF Association, Fulbeck House, 3 Westover Road, Scarborough.

South Shields (SS & DARC)—Meetings Fridays 8 pm, Trinity House Social Centre, Laygate, Shields. *G3SFL.*

Spen Valley (SVARS)—12 June (" Transistors in Cars " by H. Brooke, G3GJV), 19 June (Open Night), 26 June (Problem Night), 3 July (Annual General Meeting), 7.30 pm, The Grammar School, Heckmondwike. 5 June (Visit to Tinshill Radio Station—limited to 12). *G8BSC.*

Teeside—Second Saturday every month, Social Evening, 8 pm, The Crown Hotel, Yarm, Yorks. *G3JMO.*

Region 3 RR R. W. Fisher, G3PWJ

Birmingham (MARS)—Third Tuesday in each month, 7.45 pm, Midland Institute, Margaret Street, Birmingham 3.

(South)—4 June (Final NFD arrangements followed by a Surplus/Junk Sale), 2 July (" Demonstration of Vero Board," by T. Woodhouse), 8 pm, The Scouts Hut, Pershore Road, Stirchley, Birmingham 29. Our last meeting was well attended with Amateur Electronics G3FIK and his staff giving a run down and a good demonstration of the Trio range of equipment. *G8BHE.*

Coventry (CARS)—6 June (Visit to Radio Leicester), 13 June (Club DF Evening Event), 20 June (Meet the RSGB Zone B Representative), 27 June (Night on the Air), 4 July (Visit to CEGB's Coventry Power Station), Scout HQ, 121 St Nicholas Rd, Radford.

Dudley (DARC)—17 June (Talk by Thorn Automation), 1 July 8 pm, Central Library, St James's Road. *G3PWJ.*

Hereford (HARS)—6 June (Outdoor Activity, portable on Dinedor Hill), 20 June (Film Show), Civil Defence HQ, Goal St, Hereford. The first meeting held in March in our new premises turned out to be our twice postponed AGM as there was a very good attendance of 24 members. The meeting went off very smoothly with only a few changes on the Committee. *G3RJB.*

Leamington Spa (MWARS)—9 June (" Transistor Design and TVI, RSGB Tape"), 16 June (" Remote Control of Radio and TV Receivers," by J. Moughton), 23 June (Visit), 30 June (Open Meeting), 8 pm, 28 Hamilton Terrace, Leamington Spa.

Lichfield (LARS)—The First Monday and Third Tuesday of each month. 8 pm, The Swan Hotel, Bird Street, Lichfield. *G3NAS.*

Redditch (EWARG)—12 June (Discussion about forthcoming visit to GPO tower Birmingham), 8 pm, Old People's Centre Park Road, Redditch. The present Chairman J. Bazley, G3HCT, recently had an SSB QSO with immediate past chairman Les Hickingbotham G3HZG/5N2ABL now VR2FT on Fiji. *G3EVT.*

Shrewsbury (SARS)—5 June (Club Station), 14 June (" Forest. Walk "), 21 June (Long Mountain Excursion portable operation), 26 (Club Station), 8 pm, Shrewsbury School Signals Hut. *G3WNI.*

Solihull (SARS)—17 June (Junk Sale), The Old Manor House, 126 High Street, Solihull. Visitors always welcome. *G3VXV.*

Stafford (English Electric)—Wednesdays and Fridays, 7.30 pm. Visitors are most welcome, Association Hall, Stychfields, Stafford. *G3RLH.*

Sutton Coldfield (SCRS)—9 June, 23 June (Projects and natternite), 7 July (Talk by G2AGK), 8 pm, SCTFC Clubhouse, Coles Lane, Sutton Coldfield. *G8AVH.*

Worcester (W & DARC)—Meetings held each Wednesday and Saturday, 7.45 pm, 35 Perdiswell Park, Droitwich Road, Worcester. During June, the 7th will not be a good evening to visit the Club as most members migrate to our Field Day site. During the month preparations will be in hand for our Mobile Rally on 13 July. *G8ASO.*

Region 4 RR T. Darn, G3FGY.

Burton upon Trent (B-O-T ARS)—Wednesdays, 7.30 pm, Club Rooms, Stapenhill Institute, Burton on Trent. *G3ACR.*

Derby (D & DARS)—11 June (Visit to Lubrizol International Laboratories, The Knowle, Hazelwood—see notice board for details), 18 June (Third DF Practice Night), 25 June (Meeting in sub-basement Clubroom—topics of moment), 7.30 pm, Room No 4, 119 Green Lane, Derby. *G2CVV.*

Derby (NHCAARG)—Fridays 7.30 pm, Club Room, Nunsfield House, Boulton Lane, Alvaston, Derby. *G3LCV*

Grimsby (GARS)—Thursdays, 8 pm, North Lincs Photographic Society's Rooms, back of 50 Welholme Road, Grimsby *G3RSD.*

Heanor (TSEDRS)—Tuesdays, 7.30 pm, The South East Derbyshire College of Further Education, Ilkeston Road, Heanor, Derbys. *G3LGX.*

Leicester (LRS)—Mondays, 7.30 pm, Sundays 10.30 am, Club Room C Iroes Estate Cottage, Groby Road, Leicester, *G3UQK.*

Loughborough (LARC)—Club Room, Old Beach Yard, Wards End, Loughborough. *G3RAL.*

Lincoln (LSWC)—Tuesdays 7 30 pm, No. 2 Guardroom, Sobroan, Barracks, Breedon Drive, Lincoln. *G8BSS.*

Mansfield (MARS)—First Friday in each month, 7.45 pm, New Inn, Westgate, Mansfield. *G8HX.*

Newark (NSWC)—Mondays, Thursdays. 7.30 pm, Guildhall, Guildhall Street, Newark. *G3TWV.*

Nottingham (ARCN)—Tuesdays, Thursdays, 7.30 pm, Room No 3, Sherwood Community Centre, Mansfield Road, Sherwood, Nottingham. *G3SRX.*

Worksop (NNARS)—Tuesdays, Thursdays, 7.30 pm, Club Room, 13 Gateford Road, Worksop, Notts. *G8ON.*

Region 5 RR S. Granfield, G5BQ.

Bedford (B & DARC)—Club meets on Thursdays at the Dolphin Inn, Broadway, Bedford at 8 pm (Morse Classes at 7.30 pm).

Bishop's Stortford—16 June (Impedance Measurement of Aerials and related VSWR problem—Lewis E. Schnurr), visitors welcome, 8 pm, British Legion Club, Windmill, Bishop's Stortford, Hertfordshire.

Cambridge (C & DARC)—6 June (Final check of NFD Aerials), 7–8 June (NFD), 13 June (Junk Sale), 20 June (Informal), 27 June (Club VHF Contest—G3USB), Fridays 7.30 pm, Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

Cambridge University (CUWS)—There will be no formal meetings during the Summer Vacation, but shack facilities will be available. Anyone interested in general operating or in Moonbounce activities should contact N. Kingsley GI3RCB c/o Trinity College.

Dunstable Downs (DDRC)—Fridays at Chew's House, High Street South (Opposite Police Station), Dunstable, Bedfordshire.

Luton (L & DARS)—Meeting at 8 pm on first Thursday in June at Club HQ, Putteridge Estate, Luton, Bedfordshire.

Peterborough (P & DARS)—Meeting at 7.30 pm on first Friday in the month in the Electronics Section, Peterborough Technical College, Eastfield Road. On other Fridays meetings held at Club HQ in The Old Windmill, behind the Peacock Inn, London Road, Peterborough at 8 pm.

Shefford (S & DARC)—Meetings on Thursdays, 8 pm, Church Hall, High Street, Shefford, Bedfordshire.

Stevenage (S & DARS)—Meetings on first and third Tuesdays, 8 pm, Hawker-Siddeley Dynamics Ltd, Gunnels Wood Road, Stevenage, Hertfordshire.

Region 6 RR L. W. Lewis, G8ML.

Cheltenham (RSGB Group)—First Thursday, 8 pm, Great Western Hotel, Clarence Street, Cheltenham.

Gloucester (GRC)—Second and Fourth Thursdays, 7.30 pm, Lamb Inn, Market Parade, Gloucester.

Region 7 RR P. A. Thorogood, G4KD.

Best wishes from the Regional Representative to all clubs in NFD.

Acton, Brentford & Chiswick (ABCRC)—17 June (Why Go VHF?), 7.30 pm, Chiswick Trades and Social Club, 66 High Road Chiswick.

Addiscombe (AARC)—Second and Fourth Tuesdays, 7.30 pm 158 Lower Addiscombe Road, (Toc H. Hall),

Ashford, Echelford (ARS)—Last Thursday, 7.30 pm, St Martins Court, Kingston Crescent, Ashford, Middlesex.

Barking (B & DREC)—Tuesdays and Thursdays, 7.30 pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking.

Bexleyheath (NKRS)—12 June (NFD Inquest), 26 June (Modulation by G6HD). 34 Members (26 RSGB) came to the Brains Trust meeting. 4 members as panel answered a large range of questions including aerials, modulation and VHF/UHF Propagation. 7.30 pm, Congregational Church Hall, Chapel Road, Bexleyheath.

Cheshunt (CDRC)—6 June (Junk Sale and lecture), 4 July (Lecture and field day arrangements), 7.30 pm, Methodist Church, nearly opposite Theobalds Grove Station, Cheshunt. *G3XEW.*

Chingford (RSGB Group)—Fridays. Tel 01-524 0308.

Chingford (SRC)—Fridays, 8 pm, Friday Hill House, Simmons Lane, Chingford, E4.

Civil Service (CRSS)—17 June, 6.30 pm, Civil Service Sports Centre, Monck Street, Westminster.

Croydon (SRCC)—17 June (Talk by Veroboard rep), 7.30 pm. Last meeting saw G8TB elected as Chairman, G2RD Vice Chairman, G3GHI Press Officer, G3EUE Committee Member. Swan and Sugarloaf, South Croydon.

Crystal Palace (CP & DRC)—Third Saturday in the month, Emmanuel Church Hall, Barry Road, SE22.
Dorking (DR & DRS)—10 June (Informal meeting at "Wheatsheaf"), 24 June (2 and 4 metre mobile and general at "Plough," Coldharbour), 8 pm. Last meeting a lecture on Integrated Circuits was given by Robin Greenwood, G3LBA, informally as the announced lecturer was unable to attend. Star and Garter, Dorking.
Ealing (E & DARS)—Tuesdays, 7.30 pm, Northfields Community Centre, Northcroft Road, W13.
Edgware & Hendon (E & DRS)—9 June (Informal and field day discussion), 22 June (DF Hunt, details on Club net Thursdays, 21.30 BST, 1875 kHz), 23 June (Talk on Veroboard). Slow morse practice from G3ASR/A preceeding Thursday net at 20.30 BST. Meetings at 8 pm, St Georges School, Flower Lane, Mill Hill, NW7.
Farnham, Bucks (Burnham Beeches RC)—Meets fortnightly, Monday evenings from 16 June, 7.30 pm, Farnham Common Village Hall, Victoria Rd.
Gravesend (GRS)—8 pm, Mondays, Community Centre, Cedar Ave, Kings Farm Estate.
Guildford (G & DRS)—6 June (NFD Discussion), 17 June (NFD Inquest at Surrey University), Guildford Engineering Society, Stoke Park.
Hampton Court (TVARTS)—First Wednesday, 7.30 pm, The Three Pidgeons, Portsmouth Road, Surbiton.
Harlow (DRS)—Thursdays (General and CW Practice), 8 pm, Fridays (Junior meetings), 7.30 pm, On 20 May a tape/slide lecture on an Expedition to St Pierre was well attended, as was a lecture on Printed Circuit Technique by Fred Henshaw, G8BBO. Mark Hall Barn, First Avenue.
Harrow (RSH)—Fridays, 8 pm, Roxeth Manor School, Eastcote Lane, Harrow.
Havering (H & DARC)—8 pm, British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—First and Third Fridays, 8 pm, Rucklers Lane Hall, Kings Langley.
Holloway (GRS)—Mondays (RAE), 7 pm, Wednesdays (Morse), 7.30 pm, Fridays (Club), 7.30 pm. Field Day on June 28-9 from Tumulus Hill, Hampstead Heath. Stations active will be G3VUE/P (2m), G3THQ/P (4m), G3AFT/P (HF SSB), and G2CJN/P (160m SSB). Visitors are welcome but the GLC do not permit cars. Monten School, Hornsey Road.
Ilford—Thursdays, 8 pm, 50 Mortlake Road (off Ilford Lane), Ilford.
Kingston (K & DARS)—Second Wednesday, 8 pm, Penguin Lounge, 37 Brighton Road, Surbiton.
Leyton & Walthamstow—Tuesdays, 7.30 pm Leyton Senior Institute Essex Road, E10.
London (UHF Group)—First Thursday, 7.30 pm, in lounge for discussion Whitehall Hotel, Bloomsbury Square, Holborn, WC1.
Loughton—13, 27 June. A discussion was held at the last meeting on a display stand at Loughton Hall for the 31 May opening of a new sports hall by Sir Charles Ruggles-Brice, Lord-Lieutenant of Essex. Loughton Hall, (near Debden Station).
Maidenhead (N & DARC)—First Tuesday, 7.30 pm, Victoria Hall, Cox Green, Maidenhead.
New Cross—8 pm, Second and fourth Fridays, 225 New Cross Road, SE14.
Paddington (P & DARS)—Thursdays, 7.30 pm, Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DRS)—First and third Fridays, 8 pm, Railwaymen's Hall, Side Entrance, 58 Whytecliffe Road, Purley.
Reigate (RATS)—First Wednesday, 7.45 pm. Many members supported the Crawley annual dinner together with other clubs. George and Dragon, Cromwell Road, Redhill.
Romford (R & DRS)—Tuesdays, 8.15 pm, RAFTA House, 18 Carlton Road.
Scouts (ARS)—19 June (Colour TV talk and film show), 7.30 pm. New Committee Chairman, G3YIC, Treasurer Scot Nelson, Secretary G3FXC, Members G2CAJ, G3KYH, Junior G8CDO. Last month G3XKW spoke on "An Englishman in America." Baden Powell House, Queensgate, South Kensington, SW7.
Sidcup (CVRS)—19 June (Surplus Sale), 3 July (My First Twelve Months by G3XFG), 8 pm. New Committee Chairman G3XFG, Vice Chairman G6HD, Secretary G3VLX, Treasurer G3XMD. Congregational Church Hall, Court Rd, Eltham.
Southgate (SRC)—Second Thursday, 7.30 pm, Civil Defence Hut, Bowes Rd, N11.
St Albans (Verulam ARC)—18 June (Make that Wire Work, a talk on practical antenna systems by G3LXP). Last meeting G5AJH gave a talk and demonstration on cloud cover pictures from weather satellites. Council Chambers, Town Hall, Watford Road, St Albans.
Sutton and Cheam (SCRS)—Third Tuesday, 8 pm, The Harrow Inn, High St, Cheam.
Welwyn (MHARS)—12 June (Colour TV by Leslie Currington, who has constructed and will demonstrate his own receiver), 8 pm, Civic Centre, Prospect Place, Old Welwyn. Secretary G3PKV, H. R. Thornton, 43 Fordwich Rd, Welwyn Garden City, Herts. Tel Welwyn Garden City 23163.
Wembley (GECARS)—Thursdays, 7 pm, Sports Club, St Augustin Avenue, North Wembley. This club is open to non GEC employees by invitation, Telephone ARN 1262 for details.
Wimbledon (W & DRS)—Second and last Friday in month, 8 pm. Plans for purchase of Club tx now to be made due to successful and impromptu sale thanks to G8BVT's presentation of rx, St John Hall, 124 Kingston Road, South Wimbledon, SW19.

Region 8 RR D. N. T. Williams, G3MDO.

Canterbury (EKRS)—Details from G3MDO.
Maidstone (MYMCAARS)—30 May to 6 June, GB3YMC/A on the air at "Y" Centre Open Week, 125th anniversary, talk-in on 160 and 2m am/cw/ssb. Tuesdays, Fridays, 8 pm, "Y" Sports Centre, Melrose Close, Loose, Maidstone.
Mid Sussex (MSARS)—5 June (Demonstration of Colour TV alignment by R. Mitchell, G3YBM), 7.30 pm, Marle Place Further Education Centre, Leylands Rd, Burgess Hill.
The Annual Mobile Evening will be held on Thursday, 19 June from 7.30 pm onwards at Clayton Windmills, near Hassocks, NGR TQ 301131. Refreshments, ragchews and other attractions. Talk-in on 70·26 and 1·875 MHz approx. Everyone is welcome, enquiries to G3RXJ, QTHR.
Thanet (TRS)—6 June (VHF by G3BHW), 20 June (Visit to VHF Meeting at UKC Canterbury), 27 June (Proposed visit to Deal Coastguards).
Tunbridge Wells (WKARS)—13 June (Transistors and their uses, by Eric Tucker), 27 June (Talk on audio by a visiting speaker), 7.30 pm, Adult Education Centre, Tunbridge Wells.
Worthing (W & DARC)—Tuesdays, 8 pm, Rose Wilmot Youth Centre, Littlehampton Rd, Worthing.

Region 9 RR J. Thorne, G3PQE.

Bristol (BARC)—Every Monday and Thursday, 7.30 pm, Club HQ (G3TAD), University Settlement, 41 Ducie Road, Barton Hill, Bristol 5. 5 June ("Radio Aurora" by G2FKZ, tape lecture), 19 June (Home Built Display), 26 June ("Hints on Mobile Operation" by G8TL, tape lecture). *G3WLZ.*
(RSGB Group)—23 June ("Principles of Single Sideband" by G3JMY, postponed from April meeting), 7.30 pm, Becket Hall, St Thomas Street, near Bristol Bridge. 29 June, Longleat Mobile Rally in Longleat Park, near Warminster. Overnight stay on the Saturday by Tent or Caravan is permitted in the unique Safari grounds. Prior booking, however, to G3JMY. We hope the weather will be kind, and that we see all our friends from far and wide at our 12th friendly Rally. Our good friend Eustace G3RAJ passed away on 10 April, he inspired us all by his cheerfulness. RIP. *G3ULJ.*
Burnham-On-Sea (BOSARS)—Meet Second Tuesday in each month, 8 pm, Crown Hotel, Burnham-on-Sea, Somerset. *G3GIW.*
Cornish (CARC)—5 June ("Frequency Counters" by G3OCB also "Check your co-ax" by G3OFN. John offers a challenge to any saboteur to bring a known length of co-ax with a fault in it. 29 June, a coach from Cornwall to Longleat Rally, picking up at Perranporth and St Agnes, leaving latter at 06.00. Contact G3RBS immediately. May meeting was an excellent attendance for a talk by Mr P. W. Crouch of the GPO Radio Branch about all sides of the Radio services. Visitors to Cornwall are invited to contact G3NKE before visiting, to arrange mobile scheds, frequencies best used, visits, etc. Meet SW Electricity Board Social Centre, Pool, Camborne. *G3NKE.*
(VHF Group)—Third Thursday in each month, 7.30 pm, The People's Palace, Pyder Street, Truro. *G3XC.*
(Falmouth Group)—Meet fortnightly on Tuesdays, Laburnham Drive Mission Hall. *G3OJN.*
(Newquay Group)—Meet fortnightly on Wednesdays, Treviglas School, The Group has now 23 members. *G3THT.*
Exeter (EARS)—First Tuesday in each month, 7.30 pm, St Sidwells Methodist School Hall, Sidwell Street, Exeter. *G3HMY.*
Plymouth (PRC)—First and Third Tuesdays in each month, 7.30 pm, Virginia House, Bretonside, Plymouth. *G3SCW.*
Saltash (S & DARC)—Alternative Fridays, Burraton Toc H Hall, Warraton Road, Saltash. *G3UBY.*
South Dorset (SD ARC)—First Friday in each month, 7.30 pm, Labour Rooms, West Walk, Dorchester. At the April AGM, E. Harland was appointed Chairman, and WO2. W. Booth, G3RKD, Sgts Mess, RAC Bovingdon Camp, Dorset was appointed Secretary. *G3BKV.*

Taunton (TARS)—Every Friday 7.30 pm, SEVO HQ, The Mount, Taunton Barracks. *G3DTB.*
Torquay (TARS)—Every Tuesday and Friday, Club nights. Last Saturday, business Meeting. 28 June (Inquest on NFD) Club HQ (G3NJA) Rear of 94 Belgrave Road, Torquay, entrance in Bath Lane. At the Annual General meeting in April G2CWR was appointed President, G3LHJ D. Webber as Chairman, Mrs Western, G3NQD as Secretary, G3MEP R. Luscombe as Treasurer. The Secretary for 4 years, Dave Hind G3VNG was sincerely thanked for his great efforts in helping the Club, and Plymouth will gain a great deal on his transfer there. *G3GDW.*
Wells (WARS)—Mondays, EMIE Social Club, Chamberlain Street, Wells. *G3MQQ.*
Weston-super-Mare (WSMARS)—First Friday in each month, 6 June 7.30 pm, Westhaven School, Ellesmere Road, Uphill, Weston-super-Mare. The Club set up a Field Station at the Somerset County Scout Jamboree at Failand, near Clevedon over the Whitsun weekend, approximately 1200 scouts under canvas. *G3GNS.*
Yeovil (YARS)—Wednesdays, 7.30 pm, Park Lodge, The Park, Yeovil. *G3NOF.*

Region 10 RR C. H. Parsons, GW8NP.
Blackwood (ARC)—Fridays 7.30 pm, Blanche Cottage, off High St, Blackwood, Mon. *G6BK.*
Barry College of Further Education (ARS)—Thursdays 7 pm, College of Further Education, Colcot Rd, Barry, Glam.
Cardiff (RSGB) Group—9 June, 7.30 pm, Competition for home-made equipment. TA Centre, Park St, Cardiff.
Hoover (ARS)—This Society is part of the Hoover Social Club, and meets on Mondays at 7.30 pm, at the Hoover Factory, Merthyr. There is a station equipped with modern SSB gear, and an invitation is extended to all interested amateurs. Further details from the Secretary at the address given above.
Port Talbot (ARC)—Meetings held at Trefelin Club & Institute, Port Talbot. For further details write Secretary *GW3RVG.*
The annual Social was held on Tuesday April 29. The event was outstandingly successful, and was attended by representatives of almost all clubs in South Wales. The Regional and Zonal Representatives were available to answer queries on RSGB matters.
Pontypool (ARC)—Tuesdays 7.0 pm, Educational Settlement, Rockhill Rd, Pontypool, Mon. *GW3JBH.*
Pembroke (ARC)—Last Friday of each month. 7.30 pm, the Defensible Barracks, Pembroke Dock. *GW3LXI.*
Rhondda (ARS)—Meetings held at Pengelli Hotel, Treorchy, Rhondda, Glam. Details of future activities from Secretary, *GW3PHH.*
Swansea Telephone Area (ARS)—This recently formed Society is a section of the Swansea Telephones Sports & Social Club, and is open to the general public.
The programme includes preparation for RAE examination, morse practice and constructional projects. For details and times of meetings, write to the Secretary, M. D. E. Connor, 54 Talley Rd Penlan, Swansea, Glam.
University College, Cardiff (ARS)—A fully equipped shack is available and details of activities and meetings are available from the Secretary, Jon Seller, G3XSQ, c/o Students Union, Dumfries Place, Cardiff.

Region 11 RR M. Williams, GW3LCQ.
Nothing received for this region.

Region 12 RR A. W. Smith, GM3AEL.
Aberdeen (AARS)—June 13 (Junk Sale), 20 June (Building Competition and NFD Postmortem), 27 June (Frequency Measurement), 4 July (Talk by winners of building competition), 7.45 pm, 6 Blenheim Lane, Aberdeen. *GM3HGA Aberdeen 33838.*
Lhanbryde (MFARS)—Mondays, 7.30 pm, St Andrews School, Lhanbryde, by Elgin. *GM3UKG Clochan, Buckie 225.*
Dundee (RSGB Group)—Thursdays, 8 pm, 3 Magdalen Place (off Roseangle) Dundee. *GM3KYI.*

Region 13 RR I. W. Sheffield, GM3VEI.
Edinburgh (Lothians RS)—12 June (To be announced), 26 June (AGM), 7 30 pm, YMCA, 14 St Andrew St, Edinburgh. There will be no further meetings until September. *GM3VBB.*

Region 14 RR N. G. Cox, GM3MUY.
Ayrshire (AARG)—8, 22 June, 7.30 pm, ATC Hq, Kilmarnock.
Glasgow University (GURC)—13 June, venue, refer C. Weston, GM3VAP, 46 Manchester Drive, Glasgow W2. Tel 339 2074.
Greenock (G & DARC)—6, 13, 20, 27, June, 7.30 pm, Watt Library, Union Street, Greenock.
Mid-Lanark RSGB Group—20 June, 7.30 pm. YMCA Brandon Street, Motherwell.

Region 15 RR J. Thompson, GI3ILV.
Ballymena (BRC)—Tuesdays, 8 pm, morse and theory classes in progress, Club Rooms, 46A Bridge St, Ballymena. *GI3XDX.*
Belfast (B & D RSGB Group)—Wednesdays, War Memorial Building, Waring St, Belfast. *GI2DZG.*

Region 16 RR W. J. Green, G3FBA.
Chelmsford (CARS)—First Tuesday in each month 7.30 pm, Marconi College, Arbour Lane, Chelmsford.
Colchester (CARC)—Details from G3VAG. In conjunction with the Chelmsford ARS, and Vange (Basildon) Club, the Colchester ARC, are holding DF Hunts on the following dates, 8 June, Chelmsford, 22 June, Colchester, 3 August, Vange (Marconi's, Basildon), 24 August, Vange/Chelmsford joint event, 5 Oct, Colchester. *G3OZF* or *G3VAG.*
Gt Yarmouth (GYRC)—Fridays, 7.30 pm, 98 South Market Road, Gt Yarmouth.
Norwich (NARC)—Mondays 7.30 pm, The Clubroom, Brickmaker's Arms, Sprowston, Norwich. *G3PTB.*
Southend (SDRS)—13 June (Receiver Improvements by G3TNP), 27 June (Direction Finding techniques by G3NPF and G3AXN). 8 pm, the Staff Canteen, Ekco Electronics. *G8BSB.*

Region 17 RR C. Sharpe, G2HIF.
Basingstoke (BARC)—First and third Saturday in each month, 7.30 pm, Clubroom, Chineham House, Popley, Basingstoke, Hants, *G8CIY.*
Chippenham (C & DARC)—7–8 June (NFD from a site near the Clubroom), 10 June (DF Hunt), 28 June (A demonstration station at Monkton Park). Clubroom meetings at 7.30 pm, Chippenham High School for Boys, Hardenhuish Lane, Chippenham. *G3UTO.*
At a disappointing turn-out when only 18 members were present, the following committee was elected for the year 1969–70. Chairman, John Stevens, G3UFW; Secretary, Philip Strand, G3UTO; Treasurer, R. Frost, G3UUV. John Adams, G8BDM and Terry George, G3NJG, will be responsible for contest and special function organization.
N. Berks (AERE (Harwell) ARC)—17 June (" Beam Aerials " by V. R. Hartopp, Tech Director of J. Beams Ltd), 7.30 pm, Social Club, AERE, Harwell. *G2HIF.*
Salisbury (S & DARC)—Tuesdays, 8 pm, Sawmills, Pembroke Park, Wilton, Salisbury, Wilts. *G3HCL.*

Stratford-upon-Avon Anniversary Celebrations

Stratford-upon-Avon celebrates the 700th Anniversary of the formation of the Guild of the Holy Cross this year. This Guild was the forerunner of the present borough which was granted its charter in 1553. There will be a large carnival, dancing in the streets and much other jollification besides.

A special station, GB3SUA, will be set up for the occasion, it will be located on the green across the water from Memorial Theatre, by the River Avon. Operation will be over 11-13 July using ssb on all the main hf bands. An AM station will also be active.

The PRO of RSGB will be collaborating with this project. Any overseas guests who will be in the area during the operation are asked to contact the PRO immediately. Further information on this important event can be obtained from M. Webb, G3OOQ, 14 Townsend Road, Tiddington, Stratford-upon-Avon, Warks.

RNARS

A Bring and Buy sale will be held in HMS Mercury, near Petersfield, Hants, on Saturday, 14 June. Amateurs wishing to dispose of unwanted items of equipment or compoments are invited to bring them along.

Talk-in station G3BZU, will be on 2, 4, 80 and 160 metres from 1100 BST and the sale will commence at about 1430 BST. Members of RNARS who will be attending are invited to inform the Hon. Sec. as soon as possible.

The society is planning to be represented at the Royal Marines Open Days at Lympstone, Devon at the end of July. 2–3 August will be the main days of amateur radio interest when talk-in stations on 2, 4, 80, and 160 metres will be on the air. Further details will be available shortly.

MEMBERS' ADS

These advertisements are free to members and limited to 32 words, discounting the name, address and telephone number. Ads must be typed or printed on the form, or on a post card similarly laid out. They should be accompanied by a *recent* Radio Communication wrapper. No trade advertisements can be accepted in this section, although these and others requiring immediate inclusion should be sent to our classified advertisements department. Inclusion is *NOT* guaranteed and unused advertisements are *NOT* held over to the following issue.

Entry period for July .. 4 June to 10 June
Entry period for August .. 9 July to 15 July

Entry period for Sept. .. 5 Aug. to 11 Aug.
Entry period for Oct. .. 1 Sept. to 5 Sept.

R220 rx xtal controlled on 70·26 MHz, £5. 4m tunable rx, squelch etc £7. 50W 4m tx, all components over rated, QQV06/40 pa with mod and psu, one cabinet. 30W tx suit 2m complete, £8. D. A. Evans, G3OUF, c/o 18 Mount Park Crescent, Ealing, London, W5. Tel 01-997 5429 or bu 01-837 8688.

Pye 2166/8 tv camera control unit, broadcast quality, offers or exch for hi-fi, recording or photographic gear. R. Harris, 41 Shaftesbury Rd, Weston-super-Mare, Somerset.

Hammarlund HQ180AX rx, bs amateur bands, selectable sidebands, slot filter, 4 pos selectivity, noise limiter, 0·54–30 MHz, over £200 new, accept £140 ono. P. Champion, G3KKZ, 11 Eden Way, Warlingham. Surrey CR3 9DP. Tel Upper Warlingham 2493.

Mobile psu, 12 Vdc in, 230 Vac out, ok for both valve rx and tx, 60/-, prefer buyer collect. RSGB morse practice tape, unused 13/6 pp. Wanted gear box for AR88LF. K. Juson, G8BGQ, 25 Church Lane Sarratt, Rickmansworth, Herts WD3 6HN.

Hallicrafters SX24, overhauled, aligned, first class performer, spkr, hb, £18. Codar CR70A, as new, £14 10s. Eddystone spkr type 688 £2 10s carriage extra. P/exch, offers considered. Snowden, Swainsea Lane, Pickering, Yorks. Tel Pickering 2560.

Midsummer clearance, rummage Saturday 21st, 9–5, af/mains trans bs front end, boxes, cables, Lektrokit, psu's, valves, meters, various, 3d–10/- free/half price to local schools, clubs, secs write or call. G. Jones, G3UZZ, 104 Kew Road, Richmond, Surrey.

B44's mk III, latest release, mint cnd, 60-95 MHz, internal 12 Vdc power pack, built in spkr, 3 ch rx, complete with antenna, mic etc. fully tested, only 6 available, £15 each. 15/- pp. J. Page, 2 Beaulieu Ave, Christchurch, Hants. Tel Christchurch 5347.

Murphy rx, 60–550 KHz, 1·5–30 MHz, separate rf/af controls, bfo, bandwidths, 8, 3, 1 kHz, 200 Hz with spkr, phones, spare miniature valves, separate psu and manual £20. J. Howard, 127 Goldcroft, Yeovil, Somerset. Tel 5920 evenings.

Zenith 3M slr camera with f2 lens case, lens hood and uv filter £20, need new equipment. Buyer collect. Nigel Williams, 63 Daventry Rd, Coventry, Warks. Tel Coventry 24777.

SSB filter, McCoy Golden Guardian, 9 MHz lsb/usb xtals £14. Crystals for filter, commercial, FT423, 5775, 5773·62, 5773·33 plus 8525 for fixed operation 14300 £5. A. Dowdeswell, G4AR, QTHR. Tel Ashstead (Surrey) 2515.

Heathkit 10m tcvr (like Twoer), as new £17. 339 'scope £10 ono. Minimitter 75 ohm lpf £3. G2DD 70cm converter £3. Collect or pay carriage. Wanted Jan thru May 1945 CQ, your price. A. Altschul, G3JDP, 136 Penine Drive, London, NW2.

Electronically regulated psu, 250V, 500 mA, dc with metered output. R. Piper, G3MEH, QTHR. Tel 01-660 6263.

AR88, spkr, £35. Gearbox £2. Miniature high performance if, new components including case, less filters, £30, all ono, components, books, xtals etc, sae or please call at weekends. D. W. Aslin, G3WGN, QTHR. Tel Chester 20383.

Tape rcdr, Bang and Olufsen 2000 de luxe two track, mono stereo, three speed, echo, superimposing, separate gains for each input, no spkr or mic, vgc £100 ono. E. Chipperfield, G3LKT, 8 Douglas Haig Road, Salisbury, Wilts.

Building a 'scope? CRT's 3BP1, 5BP1 30/- 5CP1, aluminium case Heathkit printed circuit boards, schematic, 50/- buyer collects Thyristors unmarked 500 V, 20 A, trigger 0·3 A 10/-. Wanted Brenne R/P head, automatic tea-maker (repairable). Dr A. Carr, G3OSU 10 Kenneth Ct, Kennington Road, SE11. Tel 01-735 5568.

4CX250B's, brand new with unused Eimac base £8. 7289 brand new £4. B7G 2m xtals 18·033·3 kHz 10/-.—G3SJO, 17 Sutton Park Ave, Colchester, Essex. Tel Col 78842.

WS19 mk III £2 10s. Psu for rx £1 10-60 MHz converter £1 10s. TCS13 tx dismantled £8. Offers, prefer buyer collects. B. Dunkley 15 Shakespeare Rd, Mill Hill, NW7. Tel 01-959 5813.

Lafayette KT340 with spkr, exc cnd, £15. M. Salmon, G3XVV, 20 Nalla Gdns, Chelmsford, Essex. Tel Chelmsford 59522.

Mixer type exciter in new cabinet with built-in psu, new Eddystone 898 dial, requires testing and calibrating, £5. Labgear five band WBC unit £1 10s ditto coil turret £1. Valves new, 872A £1 10s. J. Drudge Coates, " Morseden," Hightown Hill Ringwood, Hants. Tel Ringwood 3962.

Genuine service manuals AR88D, CR100, 1155 BC375, SCR522, HT11. Plessey RL76A 30/- each also SWM from Jan '47 6/- per year plus post. A. Kerford-Byrnes, G6AB, 44 Preston Road, Holland-on-Sea, Essex. Tel Holland-on-Sea 3356.

Joystick de-luxe vfa and atu £4. HA350 rx with calibrator £45 ono. B44 mk II part modified, £3. M. Pawley G8AWV, QTHR.

Selective audio amplifier type 140 by Microcell Electronics, range 800-4000 Hz, fully transistorized, mains or battery, offers why. Wanted 2 BF5 valve bases ptfe or cermaic swop 840C for EC10 fb cnd. R. Horsman, G3XOD, QTHR.

KW Vanguard tx 80–10m. Heathkit RA1 rx, factory built, spkr, calibrator £30 each ono. The Treasurer, G3UNU, Nottingham University Radio Society, NG7 2RD. Tel 56101, ext 2851.

4 el 4m J-Beam £2 18s. JXK 4m converter 28-30 i.f. £13. Pye 4m tx, QQV03-20, final £4 10s. All in exc like new cnd. K. Kanalz, G5AGX, QTHR. Tel. 01-894 6880.

Heath cw crystal filter for SB101, SB301 £8. Heath SB620 scanalyzer, suitable any if, £57 10s. Jap multimeter £2 10s. Ferrograph defluxer £2. All new items. J. Barry, G3UFU, 15 Fairlawn Ct, London, W4.

2m 5 el ws yagi, 15 ft rotatable mast plus fixing brackets, selsyns, 360 deg meter. Offers to A. Kiddle, G8ACU, 53 Cranleigh Rd, Merton Park, London, SW19. Tel 01-542 3675.

Pair practically brand new Sommerkamp walkie-talkies 28·5 MHz xtal controlled hardly used £15 cost double. Marine tran giving 500-0-500 V 275 mA, 6·3 V and 3·15 V filament/A windings with matching choke £5. J. Targett, " Tarabb " 1 Rectory Terrace, Pulham Market, Diss Norfolk. Tel Pulham Market 219.

RCA 6883B valve, same as 6146B with 12 V filament 30/-. 73 July 66 to Mar 69 25/-. Electron 160m vfo coil assembly 7/6. All pp G3RDG, QTHR. Tel 01-455 8831.

Eddystone S504 recent overhaul top cnd. Pye 300 W vhf tx, ok for 144 MHz complete valves hb 50 W rack mounted modulator. Offers please, want Cambridge or Vanguard mobile for 2m, also F27AM base. G. Storey, G3HTC, 12 Vereker Dr, Sunbury-on-Thames, Mddx. Tel Sunbury 84422.

AR77E rx unmodified with hb gd cnd £25 ono. Heathkit RA-1 rx gd cnd £28. Buyer collects. W. Laycock, G3XYD, 33 Douglas Ave, Watford, Herts. Tel Watford 43516.

RA-1, professionally built, delivery possible. P. Bendall, G3NBU, 89 Hexham Road, Reading, Berks. RG2 7UA.

Ferranti 4 valve s'het portable battery type in almost mint cond, coverage mw, 1 W with spkr muting switch, circuit of inverter supplied. £5 ono plus pp. E. Jones, 234 Ilchester Cres, Bedminster Down, Bristol 3.

CR150 with ac pu 1·95-60 MHz double superhet £20. CR300 15-26 MHz £5 delivered reasonable distance or London. D. Byrne, G3KPO, Jersey House, Eye, Peterborough. Tel Eye 351.

Valves. 6SA7, EF36, 6SQ7, 6J5, 6B8, 6AG7, EL32, OM6 (EF39), 6L7, 6J7, EF50, 6V6G, EF80, ECC82, EF91, PCC84, ECL80, 3/- each. OD3 (VR150) QVO/47, 6L6G, 10F1 5/- each. 832, A1714, A2521 10/- each. G. Jeapes, G2XV, 165 Cambridge Rd, Great Shelford, Cambridge.

Printset 2m transistor tx complete but requires attention 35/-. Reporter modified for 2m less psu £4, R1155B, internal psu and output stage £4. 2m converter, 14-16 MHz output 30/-. W. Hartog, G3JEJ, " Cotton," Top Road, Cawthorpe, Louth, Lincs. Tel Louth 2887.

Guts of 88 set 10/- post extra. 6K7G, 6K8G, 6B8G 6d each post extra. Schoolmaster model aeroplane fitted Frog 1·5 cc diesel, silencer, Futaba rx/tx £16 post extra. A. Haines, 2 Hampton Dene Rd Tupsley, Hereford. Tel HR 3964.

SCR522 tx £1 ARC5 Command tx 3–4 MHz 50/-. TX127 with reversible motor 7/6. Potted Parmeko choke 10 H 250 mA new £1. WS19 set variometer 5/-. Carriage extra. G. Steele, GM3SIY, 28 Erskine Hill, Polmont, Stirlingshire. Tel Polmont 2025.

Cossor 1035 double beam 'scope, £15. HE30 rx, dirty wave change switch, will operate from 12V with suit psu. J-Beam 4 ele 4m beam £2 15s. Codar Pre-selector £3. J. Adey, 18 Mount Park Cres, Ealing, London, W5. Tel 01-997 5429 or bu 01-837 8688.

TCS13 rx, TCS tx, xtal min input, manual, psu £20. CR100 manual £17. Buyer collects. R. Saunders, G3CVW, 1 Churchfields, Sandiway, nr Northwich. Ches. Tel Sandiway 2512.

Praktina slr camera also 240mm telephoto £47 ono. Would exch hi-fi test-gear, scope, etc, ffrr pickup enclosure. Phone details. Humphrey, 141 Upper Grosvenor Rd, Tunbridge Wells, Kent. Tel 0892-20183.

Heathkit Mohican rx with manual. £20. No offers. Prefer buyer collects. G. Hill, G8MZ, 4 Saintbury Close, Stratford-upon-Avon, Warks. Tel Stratford 5595.

Linear amplifier, 80-10m, 400W pep, self contained psu, relays, aerial c/o etc, very compact £20. Also Heathkit balun coils complete £2 10. R. Powell, Wits End, Lower Odcombe, Yeovil. Tel West Coker 712.

HW100 tcvr less pu, virtually no drift, wkg perfectly, 6 mnths old, £135. G3PDT, QTHR, Tel 021-454 1825.

KW2000, G line cabinets, complete with ac, dc psu's or exch SB400, SB401 tx. Price wanted £150 or offers. G. Green, G3JNX, 54 Langley Ave, Brixham, Devon. Tel Brixham 3142.

DX40 with VF1U and manuals, nice cnd and guaranteed perfect £22. Delivered 50 miles. Wanted TW2 tx. Carpenter, G3TYJ, 10 Avenue Rd, Frome, Somerset.

B44 mk III, unmodified £5. Valves 813 (4) 20/- each. Free delivery 50 miles Portsmouth or carriage extra. K. Randall, 13 Hawthorn Rd, Horndean, Portsmouth, Hants.

Selling all, Top Band Cannonball £20, HRO, all bs except 40m £20. DX4OU, VF1U, external modulator, aerial co relay, control unit atu swr, offers. No. 36 tx 10-10 MHz £8 or sell complete. J. Worters, G3XRW, 29 Windmill Lane, Epsom, Surrey. Tel 01-393 8894.

Best offer of assorted crystals secures 19 in rack tx, worth about £5. resprayed etc. J. Stacey, G8BXO, 3 Westpark, South Molton, Devon.

RSGB Handbook 3 ed 18/- ARRL hbk 32 ed 12/6. 1 vol 73 Mag 12/- Callbook 61 10/-. Crystals 5160, 6280, 9720, 8260 kHz, 10X, 3/6 each. Post extra. F. Barrett, G8CO, 2 Whitehall Road, Grays, Essex.

QQV03-10 (2) 12/6 6C10 (2) 10/-, JB C12 300pF, 2 kV £2. LP 4 W coax switch £3. E. Kelly, GM3POK, QTHR.

EC10 mains and battery psu, s meter, £35 ono. 30 ft wooden tower complete £5. UM3 mod tran £3. 2·5 cc Weber diesel engine r/c with 10 × 5 prop requires running in. R. Gray, G8AWO, 18 Old Rectory Drive, Hatfield, Herts.

Must clear Codar AT5 mains psu, CR70A rx, PR30, Nova Pal df rx, Cossor tape recorder, TR101 tcvr, mains psu, Grundig 3D rx, 20 ft telescopic mast, 12 ft whip, £50 lot or exch rx. Buyer collects. M. Hale, 21 Collwood Close, Fleetsbridge Park, Poole, Dorset. Tel Poole 5938.

Codar pr selector PR30X perfect £5. J-beam 6 el zm yagi perfect 30/-. Wanted Heathkit psu HP23, spkr SB600. Deckley, G3UFQ, QTHR, Tel 021-373 6642.

ZC1 mk II tx/rx, 160, 80, 40, mains in £15 complete. R1294 rx 500-3000 MHz tuneable, perfect wg order £15. K. Smith, G8BEN, 36 New Rd, Whittlesey, Cambs. Tel Whittlesey 2596.

Hb monitor scope, G line case, exc finish, 2¾ in crt, base needs variable capacitor £4 10. VCR97 crt, vase, mask 20/- plus pp. RF24 unit, modified for 10, 15, 20m, if 7 MHz faulty 15/- plus pp. GM3VXR, 70 Leven St, Motherwell, Lanarkshire, Scotland. Tel Motherwell 66597.

Labgear LG300 and matching pu/mod £60. Eddystone 888A £70 all immaculate, one owner, going ssb, deliver by car 40 miles. J. Hooker G3FSJ, St Aubins, Oakhayes, Woodbury, Devon. Tel 637.

Pye Cambridge transistor radio-telephone, crystal 70·26 MHz, 6 W, rf out, 50 kHz block filter, handbook, £60 or offers. J. Wuille, G3SZM 18 Patricia Ave, Goring-by-Sea, Sussex.

Trio JR500S 160m incl £50. Cannonball mk II 160m, 6146 pa, psu £28. B3 xtal mix £1. RF45 fsm £1 5. Delta control £4. Atu 160m with 1 rf meter £1 10. Buyer collects. R. Lanchbury, G3RFB, 4 Tedder Drive, Waddington, Lincoln.

G2DAF rx, front end needs realignment, 898 dial, Kokusai filter Electroniques coils, £30 ono. G. Wray, G3MVO, 93 Wolferton Lane, Willerby, Hull. Tel 0482-656313.

Courier SSB tcvr mains and mobile psu, KW atu, mobile whip, best offer over £110 for quick sale. G3TUO, QTHR, 01-508 0935.

CR100 rx in gd wkg ordr £14. Pye BBC2 masthead preamp £1. 2 Linear LP1 tapedeck record playback preamps with erase oscillators match 1⅞, 3¾, 7½ ips, £5 each. C. Dykes, G8CKH, Linden, The Drive, Sidcup, Kent. Tel 01-300 4825.

Lambda Investment Company £100 of 6 per cent stock for sale, including June dividend. Holder forming investment family trust. reason for disposal. Offers to Wilson, EI2W, 23 Rathgar Rd, Dublin 6. Tel 977879.

455 kHz mech filter 1·75 : 1 shape factor at 6/60 dB c/w QCC crystal £10 10s. ono. 4 7360 10/- each. GEC 100 kHz crystal 30/- 2 QV08/100 £1 the pair. Wanted TW2 tx or similar. A. Hewitt, G3SVD, 15, Paynesdown Rd, Thatcham, Berks.

4X250B bases perfect cnd £4 each plus post. Thompson, G3AMF, QTHR.

VHF/UHF valves, klystrons, crt's, amateur hf equipment, power packs and testgear, sae list. W. Mansell, G2CPM, 46 Headley Rd, Woodley, Reading, RG5 4JE.

Vols 1-5 and vols 1955-59 Newnes Radio and TV Servicing. State your price. BC454 rx 50/- RF26 and 27 units incomplete 5/- each, some with valves. H. Crowther, G3HA, 120 Huddersfield Rd, Bradford 6, Yorks. Tel Bradford 677674.

Swan 350, fb cnd with makers ac psu £200 ovno. Sphinx tx gd cnd £45. Linear 2 × 4X150 in pa, hb, £45 ono. D. Mahony, G3SUK, Hollybush Farm, Rattlesden, nr Bury St Edmunds, Suffolk. Tel Rattlesden 352.

BC221 charts and power pack £10. 2m converter, transistorized, i.f. approx 4-6 MHz £6. G whip system mobile aerial 160 10, 15, 20m £9. S. Williamson, G3WGU, 3 Beaufort Ave, Bispham, Blackpool.

2m converters 14/16 MHz TW2 £5. AF139 £3 10. 3 MHz xtal (2) 10/- each. 5B/254 (3) 10/- each. Xtals 6075, 6006·6, 7900 4/- each. 39·518, 45·2, 46·1, 44·3, 5/- each. Ventaxia window fam £4. 5B255M (2) 10/- each. Wanted 43·3 MHz add post. Marriott, 28 Astrop Rd, Middleton Cheney, nr Banbury, Oxon. Tel Middleton Cheney 623.

AR88LF, gd cnd, hb and valve spares. M. Osbourne, G3YGM, 16 Forest Ave, Cowplain, Hants.

Hamgear Preselector as new, complete with instructions, circuit, etc. £4 10. T. Biddlecombe, G3WAO, QTHR. Tel Gravesend 2717.

SB10U ssb adaptor, appearance and performance as new, £25 ono. H. Bluer, GW3UUZ, Nash Point Lighthouse, Llantwit Major, Glamorgan. Tel Llantwit Major 306.

Eddystone 888A rx with s meter, cnd and performance as new £70. Gone transceive. Wanted late model EC10 rx. C. Houltby, G3UHS, 9 Bayard St, Gainsborough, Lincs.

DX4OU VF1U, 1967 £25. BC348R faulty £4. Geloso converter 4-6 MHz i.f. £6. Delta aerial relay as new £4. N. Mackenzie, GM3WIJ, 57 Countesswells Terrace, Aberdeen. Tel 37019.

Sinclair Z12 brand new and boxed 85/- no offers, post free. I. Davey, 8 King Richard Road, Hinckley, Leics.

8 yrs SWM's. 1965 ARRL hb, various cabinets, 100 kHz xtal, 500 kHz xtal, various trans, valves, meters, your price taken, room required, sae Wanted one 4X150 base G3AAJ QTHR, 01-989 6741.

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Hammarlund HQ110A rx exc cnd £75, DX40 working £10. R. Maule, G3OEF, 31 Chatsworth Ave Winnersh, Berks. Tel West Forest 5016.

Tiny Tim petrol charger reconditioned 300 W £16 ono, M50 rx 14-600 kHz octal valved offers ? Brand new 900 to 1310 MHz cavity wavemeter, rev counter scale, calibration chart £6, sae. Norrington, G3IUD, 58 Kings Road, Wilmslow, Cheshire.

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Two metre complete station. Tx QQVO3-20 pa, metred, single switch control, GMO290 transistor converter into Command rx 4-6 MHz tunable i.f., power unit £25 or exch good hf rx. Wanted Twomobile. M. Wellspring, G8AWE, 202 North Hyde Lane, Southall, Mddx. Tel 01-574 0418.

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RA1 works ok case poor £20. Telefunken 55 rcdr, vgc £12. Garrard 4HF transcription deck vgc £4. R. Nicholls, G8BKY, 14 Hollydale Rd, Edington, Birmingham 24. Tel 021-373 8973.

DX100U gd cnd £35. Eagle RX60N 55 kHz-30 MHz £10. Class D wavemeter £2 10s. Buyer collect tx, rest post extra. T. McLean, G3VUB, 18 Broughton Road, Wolviston Court Estate, Billingham, Teeside.

Have ribbon mic, want hi-fi spkrs, single record turntable. R. Lamb, G3IDD, QTHR.

HRO modified 6BA6's product det, xtal cal, psu, hamband coils, 15m bs. Hallicrafter HT40 tx 75 W cw, 60 W phone, pi-output, auto tran £40 ono. Sell separately offers. G. Parfitt, G3BRT, 10 Burlington Rd, Bristol BS6 6TL.

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UM1 35/-. Wanted UM3, pair KT88 or TT21. State price or part exch with UM1. B. Gale, G8BIL, 27 Colebrook Rd, Shirley, Solihull, Warks. Tel 021-744 1457.

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G2DAF mk II tx, mech filter, QCC xtals, all commercial components, JB special tx pa condenser. Spare valves and psu £70. Ring GW2-BFD Cardiff 64886.

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Sale or exch HT11A radiotelephone for any useful gear, R. Woodman, 38 Crete Rd, Dibden Purlieu, Southampton. Tel Hythe (Hants) 3438.

Mobile rx 7 band 10m-BC, 11 transistors, bfo, chrome panel, very small tx, 4 valve, 60 W, 6 band, needs psu, 30 W transistor modulator, 12 V pos earth, prize winners see *Wireless World* Dec 61 and May 62 offers. C. Salvage, G3HRO, 2 Cedar Rd. Bromley, Kent. Tel 01-460 7660.

Linear 2 × 4-125A built in psu 10-80m with cabinet £35. Gibbs, Copperwood, New Rd, Digswell, Welwyn. Tel Welwyn 4078.

Heathkit OS-2 portable scope, almost unused, exc cnd, £20 ono, available at Rochdale or London. P. Hargreaves, 6 Harrow Ave, Rochdale, Lancs. Tel 0706-48092.

Newnes Radio and TV Servicing 1952-68, 18 volumes, all clean, most mint £28 ono carriage paid extra. Berry, G8BDB, Highfield, Kirkhead Rd, Grange-over-Sands. Tel Grange 2485.

22 set modified for atu with mains psu wkg vgc £7. W1191A wavemeter with charts and conversion details, mains, £7, wkg, vgc. Hewitt, G3SGH, 114 Canterbury Rd, Kennington, Ashford, Kent.

Heathkit RG1 £25 ono. P. Hooson, 82 Sandbeck House, Grove Place, Doncaster.

HROMX, modern front end, 7 coils, s meter, bs 10, 15, 20, 80m, spkr, pu, £17 10. Alliance antenna rotor with indicator £5. 4 ft enclosed rack, Q 5er, 1600 V mains trans etc. R. Reynolds, G3AVL, 43 Pendennis St, Anfield, Liverpool 6.

Prize winning mobile rig 160m am, includes tx 10W, ps, mod, mic, transistor psu, Command rx, fs meter, CF loading coil, can be seen working by arrangement. M. Niman, G3LGN, 9 Montgomery Drive, Unsworth, Bury, Lancs. Tel 061-766 2942.

Tx-rx xtals for Pye Ranger new 30/- pair. Unused EMI tv tube, TA10 15/-, Mullard 2½ in crt DG7-6 20/-. RAF Manual on 12 equipments including T1154, TR1196, TR9 40/-. All plus carriage. A. Cockle, 14 Leewod Way, Effingham, Leatherhead, Surrey. Tel Bookham 5439.

G2DAF tx, unfinished, new xtal filter, Philpotts cabinet. Wanted 4X250 bases, 9 MHz filter. J. Colebrook, G3BJD, Green Gable, Springfield Rd, Bigrigg, Egremont, Cumberland.

NCX5 with National psu/ls £210. KW SWR bridge £5. Metred 234A psu £3. All mint cnd. Metred HRO with psu and amateur bandspread coils plus gc coils exc performance, best offer secures. P. McConnachie, GM3CRY, Bonfield Rd, Strathkinness, St. Andrews, Fife, Scotland. Tel Strathkinness 219.

KW Viceroy mk IV extra half lattice filter, final 6146B's, exc cnd, £85. G3RUX, 12 Park Lane, Pinhoe, Exeter, Devon.

Labgear LG300 tx 80-10m complete with hb modulator, psu etc £40. Also AR88D chassis complete with coil pack, dial and gearbox. Will deliver 50 mile radius. Wanted Heathkit HD10 Electronic Keyer. B. Purchase, G3FWD, 126 Renton Road, Oxley, Wolverhampton. Tel Fordhouses 2404.

DX100U £40 ono, could deliver reasonable distance. *S.W. Magazines*, Jan 59 to Feb 68, mint, free if collected, otherwise £2 inc pp. P. Robson, G3NZK, 6 Eastleigh Rd, Stubbington Farm Estate, Fair Oak, Eastleigh, Hants. Tel Fair Oak 1228.

WANTED

2m rx, suitable mobile, TW Twomobile or similar, why. D. Platt, G8BMG, 11 Coronation Ave, Knypersley, Stoke-on-Trent. Tel Biddulph 3559.

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Six large stand off insulators to fix to eave corners. S. Tonkyn, Tydd St. Mary, Eling Hill, Eling, Tolton, SO4 4HF.

HE30 rx or similar, must be viewed prior to purchase, no junk please, also KW Q multiplier. Pryse, G3WXT, QTHR.

Newnes Radio and TV servicing 1965/66 vol onwards, must be in gd cnd, state price, also 2m mobile transceiver required, state model and price. N. Cooper, G3LMO, RAF Amateur Radio Club, RAF Rheindahlen, BFPO 40.

These handbooks free to whoever needs them. BC221A, 224B, 348B, 312C and 342C. Also circuit only of CR100/2. L. Adair, 3 Belmont Close, Shaftesbury, Dorset. Tel Shaftesbury 2427.

Woden DT3 driver tran. Your price paid. L. Raymond, G3BHN, 17 Hill Grove Ave., Yeovil, Somerset.

2C40, 2C42, 2C43, EC158 valves required, also S meter for Eagle RX80. A. Wakeham, G3EEZ, 1 Kendal Close, Aldersley, Wolverhampton. Tel 751378.

Any information on history of amateur radio, 1911 to present, photostats of early licences, copies of photographs etc, personal memories very welcome. P. Hyde, 8 Highgate Drive, Walsall, Staffs. Tel 22745.

Good quality atu, E-Zee match or similar. Details to D. Richmond, GM3XVJ, 9 Wellpark, Alloway, Ayr.

Xtal 12·01-12·02 MHz, FT243 or HC6U. C. Stone, G8BKU, 15 Kennart Rd, Poole, Dorset.

TW 2m Communicator. H. Pinchin, G3VPE, 61 Colebank Road, Hall Green, Birmingham, 28. Tel 021-777 1320.

Converter CV253/ALR or any APR tuning unit, cnd unimportant, please state price. F. Laverty, 231 Connaught Road, Luton, Beds.

3 in tube scope exch for wkg R1155 mod with built in psu. Sell HRO coils, dial and gearing, R1224A rx or exch these for above scope. Sae for reply please. A. Talmage, 33 Atherton Cres, Hungerford, Berks.

LG300 with companion psu and modulator. J. Woolley, G3ESR, QTHR. Tel Wigan 41774.

Set of morse tuition lp records, must be in reasonable condition. H. Wright, 5 Globe Cres, Farnham, Bishops Stortford, Herts.

Command rx, 6-9 MHz, circuit diagram and rf mixer oscillator coils required. All letters answered. J. Mather, G8CMI, 6 York Rd, Torpoint, Cornwall. Tel Torpoint 496.

Marconiphone, Burndept, McMichael rx about 1925/6 vintage with horn is preferable. Other makes considered, cash or exch. Have geared motors suitable rotators, also have 0·25, 0·75 and 1 hp single phase 240 V ac motors. F. Neale, 11 Pine Drive, Wokingham, Berks. Tel Eversley 2626.

I wish to thank the RAIBC, G2SB, Wirral Amateur Radio Society for their help during my present disability. Thank you gentlemen. J. Egerton, 40 Fishers Lane, Pensby, Heswell, Wirral, Ches.

Borrow or purchase handbook for Eddystone 358 rx. V. Cheeseman, G3AOK, 71 Walton Ave, Cheam, Surrey. Tel 01-644 3545.

UM1 or UM2 mod tran, 70 MHz converter. E. Inman, G2DRA, 27 Marlow Cres, Harrogate.

Prop pitch motor heavy duty and pair of matching selsyns. J Campbell, GI3OLJ, 48 Abbey Drive, Bangor, Co Down.

10, 11·5, 18·5, 25·8 MHz xtals, any holder, 8 MHz FT243 xtal, pair 6GJ5A valves. G. Barnard, G3VSZ, Lulworth, Rushmoor Ave, Hazlemere, Bucks.

Any information on Klystron type WL417A. For sale teleprinter, 5 channel tape and 8 paper rolls, also quantity of valves and many other odds and ends. Please write stating requirements. M. Adcock, G8CMU, 3 Hall Drive, Finedon, Wellingborough, Northants. Tel Finedon 284.

Circuit and handbook for xtal cal no. 10. J. Hogg, G3NUA, 68 Southbrooke Ave, Hartlepool, Co Durham. Tel Hartlepool 5643.

Urgently required for a 4X4 amateur, idler wheel for Garrard 301 turntable, or information where obtainable. Most grateful for immediate replies please. K. Kahn, G3RTU, 12 Cliffdale Drive, Manchester M8 6QF.

Olympic loaded Z match 50/150 W. Sweeney, 58 Grosvenor Road, Epsom Downs, Surrey. Tel Ashstead 2689.

Trio JR500 or similar type in exch for Flight Link superhet radio control with DEACS and new O.S. 30 engine or £65. A. Robinson, 67 Lincoln Rd, Enfield. Tel Enfield 3363.

Xtals suitable 2m and 4m, FT243 or miniature types preferred. Walsh G8CEF, Sedan, Stock Lane, Ingatestone, Essex.

GDO for 1-30 MHz with reasonable calibration. Any make or homebrew, details to P. Catchsides, 80 Towncourt Cres, Petts Wood, Kent, BR5 1PJ.

Schoolboy requires circuits and/or radio control gear for model boat. P. Beardon, 34 Ashley Drive, Twickenham, Mddx. Tel 01-894 1892.

Mobile whip, 80m Hustler or heliwhip preferred with mount. Johnson G3HLG, The Laurels, High St, Collingham, Newark, Notts. Tel Collingham 384.

Urgently wanted for holiday in Eire, 2m tx, will swap for HRO or buy Pye base, Ranger etc, suitable contest weekend during holiday. B. Cliffe, G8BRT, 16 Moorbank Drive, Sheffield, S10 5TH. Tel 303577.

Trans 400-0-400 V, 400 mA, Xtals 24016/24037 MHz or details of sources. A. Blockley, 84 Elmwood Way, Basingstoke, Hants.

RCA 7094 urgent. A. Bate G3LGZ, 63 Dost Hill Rd, Twogates, Tamworth, Staffs.

Creed 7 teleprinter in wkg ordr. Details to the Secretary, Amateur Radio Soc., The Union, University of Aston, Gosta Green, Birmingham 4.

Wanted "Then and Now" pages of USA callbooks for Winter 68 and Spring 69. Compensation for mutilating your callbook. C. Harrington 14 Furze Rd, Maidenhead, Berks. Tel 0628-28066.

Urgent 12 V psu for BCC69D would consider non wkg if vib. tran ok. Details to B. Fenwick, G8BTC, 77 Coniston Rd, Croydon, CRO 6LQ.

Gd cnd DX100U es hb, no mods except 6146B's, Also 100W 75 ohm carb resistor. Details to F. Porter, G3VVP, 45 Haddington Rd, Stoke, Plymouth. Devon.

GDO in gd cnd, also HRO bs coil 28-40 MHz. Paddington Amateur Radio Soicety, G8AWV, QTHR.

High band 160 MHz model Pye Rangers or similar, must be unmod and gd cnd, unable collect except local but will pay carriage. A. Ernest, GW3LQE, Glenholm, Bradford Place, Penarth, Glam. Tel 702111.

SSB-CW tx for college society, 80-10m approx 100W pep input, max £60. J. Rush, G3YKR, Haywardsfield, Wycliffe College, Stonehouse, Glos. GL10 2JG.

Valve type QY4-250, 4-250A, please state price. P. Plunkett, G8BQZ, 29 Margetston Ave, Norwich, Norfolk. Tel Norwich 35164.

Xtal 10·55 MHz FT243 or 10X base. E. Hotchkiss, GW3VLU, Plot 26, Beechwood Drive, Penarth, Glamorgan.

AM 912 pa unit, KVGXF9A filter with xtals. G. Morrison, 85 Sutton Rd, Heston, Mddx. Tel 570-6181.

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PYE Cambridge transistor radio telephone crystalled 70·26 MHz 6W RF out 50 KHz block filter, handbook, £60 or offers. Wuille, 18 Patricia Avenue, Goring-by-Sea, Sussex.

EDDYSTONE 840C vgc, £40. Matching LS for all Trio receivers, £3 10s. Eagle Signal gene. £10. Scope £10. —Box. No K7401, c/o Radio Communication, 4 Ludgate Circus, London, EC4.

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Hallicrafter Equipment:			
SX-130 Communications receiver	86	15	0
SX122 Communications receiver	148	5	0
SX146 Amateur band receiver	137	5	0
HT 46 SSB transmitter (works in transceiver with SX146 receiver)	192	5	0
Mosley Electronics (Beams)			
TA 33 Jr Tri-band three element beam	27	5	0
TA 32 Jr Tri-Band two element beam	19	5	0
TA 31 Jr Tri-Band dipole	11	11	0
V 3 Jr Tri-Band	8	5	0
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Automatic Tenn-A-Liner	19	19	0
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Ball Bearing Guy Ring	2	7	6

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2-A10 Transmitter	43	7	0
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Type MM2 Microphone	2	17	11

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PR30 preselector	5	19	6
PR30X (with psu)	7	19	6
RQ10 Q Multiplier	7	5	0
RQ10X (with PSU)	8	17	6
CC40 Control Unit	6	15	0
CR45K receiver	9	15	0
Partridge Electronics			
Joystick Standard	5	2	6
Joystick De-luxe	6	5	0
Type 3 Tuner	2	15	0
Type 3A Tuner	3	19	6
Type 4 Tuner	5	5	0
Type 4RF Tuner	6	17	6
Echelford Communications			
B1/4 4 Metre Tx	30	0	0
M1/4 4 Metre Tx	40	0	0
C1/4 4 Metre Convtr.	10	10	0

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CR45RB receiver	11	19	9
AT5 Transmitter	16	19	6
250 volt PSU	8	10	0
12/MS PSU	11	10	0
12/RC Control	2	10	0
T28 receiver	15	17	6
Mini Clipper Kit	2	4	6
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Shure 202	6	0	0
Shure 444	12	15	0
Shure 401A	6	15	0
Shure 275SK	5	5	0
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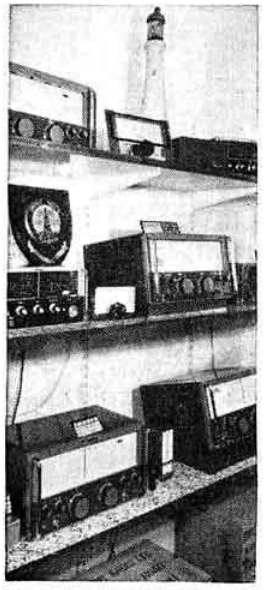

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(FOUNDED 1913) (INCORPORATED 1926)

PATRON H.R.H. THE PRINCE PHILIP, DUKE OF EDINBURGH, KG

Application for Corporate* or Associate* Membership

Radio Society of Great Britain,
35 Doughty Street,
London, WC1.

* I hereby apply for election as a Corporate Member of the Society and enclose a remittance for £2/10/- being the amount of my first annual subscription.

* Being under 21 years of age and not holding a current Amateur Radio Transmitting Licence I hereby apply for election as a Non-Corporate (Associate) Member of the Society and enclose herewith a remittance of £1/5/- being the amount of my first annual subscription.

I, the undersigned, agree that in the event of my election to Membership of the Radio Society of Great Britain, I will be governed by the Memorandum and Articles of Association of the Society and the rules and regulations thereof as they now are or as they may hereafter be altered; and that I will advance the objects of the Society as far as may be in my power; providing that whenever I shall signify in writing to the Society addressed to the Secretary that I am desirous of withdrawing from the Society I shall at the end of one year thereafter after the payment of any arrears which may be due by me at that period to be free from my undertaking to contribute to the assets of the Society in accordance with Clause 8 of the Memorandum of Association of the Society.

Date..... **Signed**.....

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Nationality..... Age (if under 21).....

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Signed.....

* Please delete where inapplicable

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